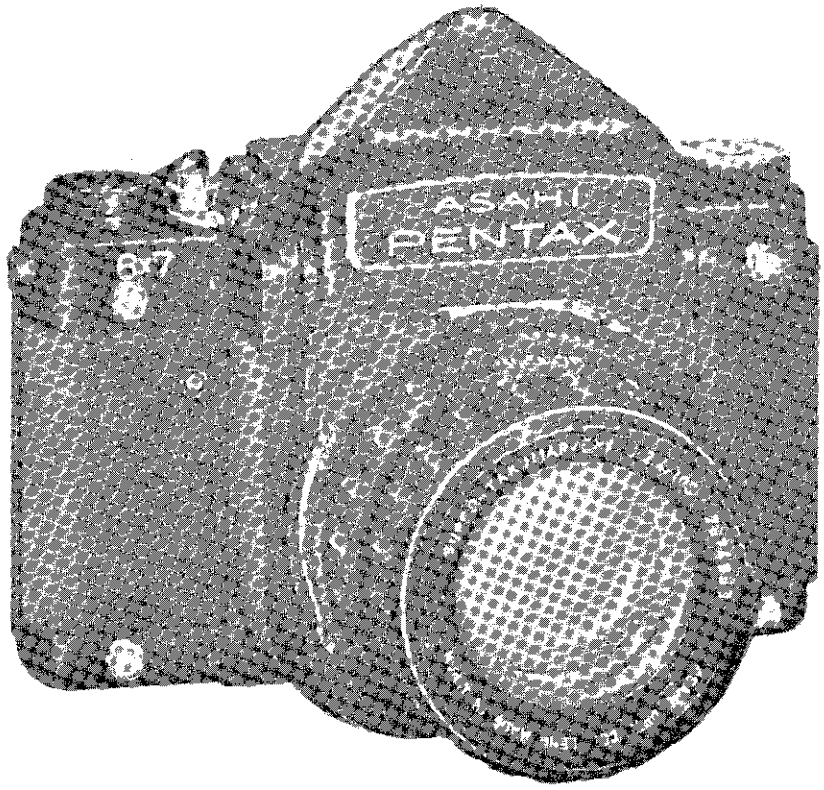
ASAHI PENTAX 6×7



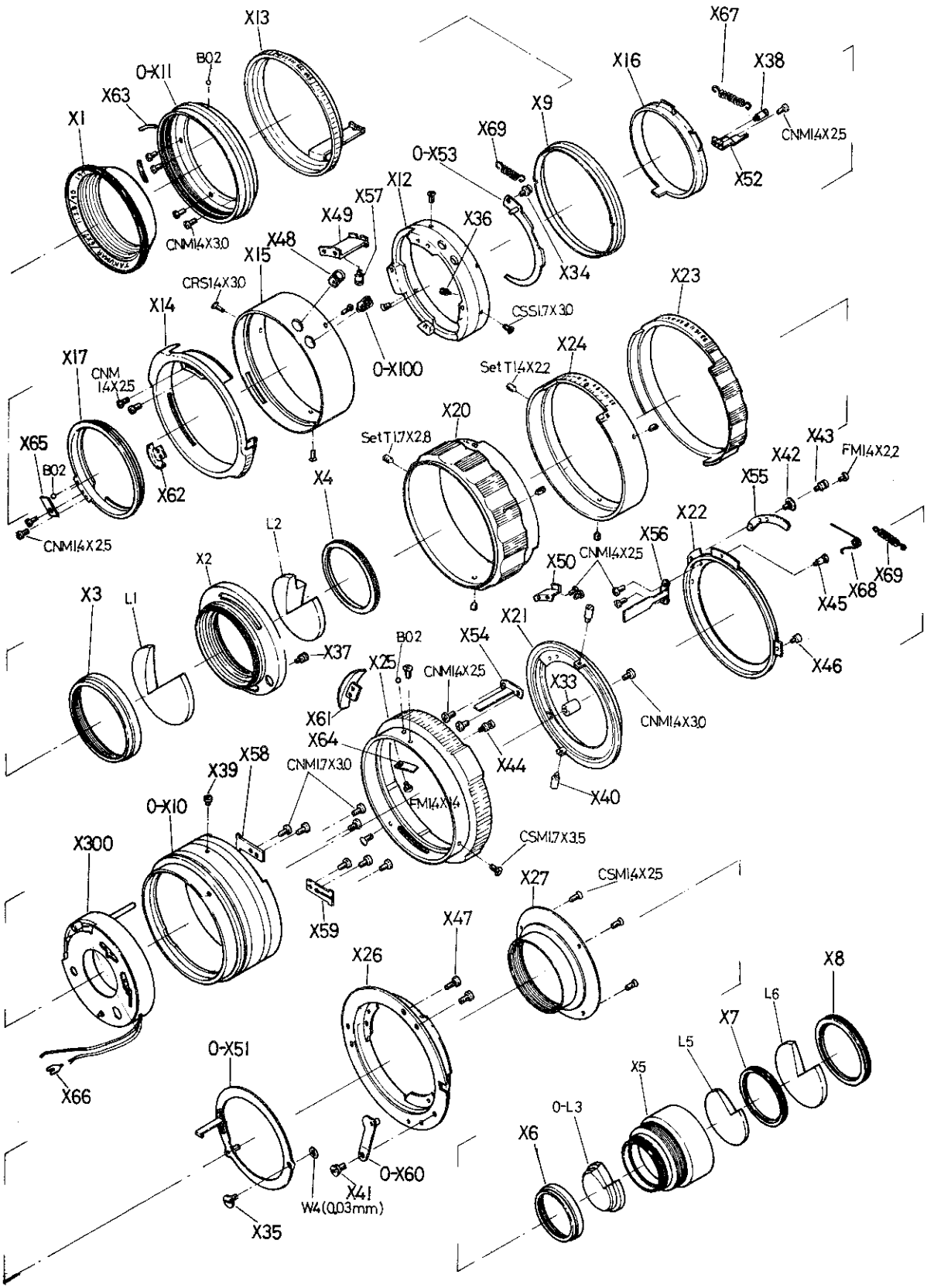
Lenses and Accessories
Service Manual

PRODUCT No. 46110

SUPER-MULTI-COATED

TAKUMAR 6×7 1:2.8 90mm

EXPLODED ILLUSTRATION



Product No. 46110

Super-Multi-Coated TAKUMAR 6×7 1:2.8 90mm

LIST OF SERVICE PARTS

Product No. 46110
SUPER-MULTI-COATED TAKUMAR 6×7 1:2.8 90mm

Note: 1. The parts with numbers starting '0 -' are assembled parts.

2. Only the available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
X1	Nameplate ring	1	
X3	1st lens retainer ring	1	
X4	2nd lens retainer ring	1	
X6	4th lens retainer ring	1	
X7	5th lens retainer ring	1	
X8	6th lens retainer ring	1	
X9	Front frame retainer ring	1	
0-X10	Main barrel assembly (X10, X18, X19, X58, X59, CNM1.7 x 3.0 x 4)	1	
0-X11	Cover frame assembly (X11, X29, X65)	1	
X12	Supporter ring	1	
X13	Shutter scale ring		
X14	Shutter set ring	1	
X15	Ornament ring	1	
X16	Shutter selector ring	1	
X17	Shutter selector lever install ring	1	
X20	Distance scale ring	1	
X21	Diaphragm turning ring	1	
X22	AM selector ring	1	
X23	Diaphragm scale ring	1	

Parts No.	Description	Quantity	Interchangeability
X24	Depth of field scale ring	1	
X25	Bayonet install ring	1	
X26	Bayonet ring	1	46080-X23
X27	Light seal ring	1	
X33	Actuator plate receptacle	1	
X34	Release lever shaft screw	1	
X35	Actuator plate screw	1	46000-00039
X36	Lead wire install screw	1	
X37	Spring hook screw	2	
X38	Shutter selector plate screw	1	43742-X44
X39	Distance restriction screw	1	~~43892-X47~~
X40	Diaphragm turning screw	2	~~43851-00045~~
X41	Selector lever screw	1	46080-X44
X42	Hook lever shaft screw	1	46000-00038
X43	Hook lever retainer screw	1	46000-00043
X44	Selector ring stopper screw	1	46000-00048
X45	Restitution spring hanger screw	1	
X46	AM selector screw	1	46000-00041
X47	Mount ring retainer screw	6	46080-X43
X48	Cable release seat	1	
X49	Shutter set lever	1	
X50	Diaphragm coupler lever	1	
0-X51	Actuator plate assembly (X51, X30, X32, X2, X57)	1	
X52	Shutter selector plate	1	

Parts No.	Description	Quantity	Interchangeability
0 -X53	Release lever assembly (X53, X28)	1	
X54	Diaphragm turning plate	1	
X55	Hook lever	1	
X56	AM selector plate	1	
X58	Helicoid guide plate	1	
X59	Helicoid guide plate	1	
0 -X60	Selector lever assembly (X60, X31)	1	46080-0-X56
X61	Manual lever	1	
X62	Shutter selector lever	1	
X63	Turning stopper	2	~~46000-00060~~
X64	Preset spring	1	46000-00061
X65	Click spring	2	~~43542-X59~~
X66	Earth connector	1	
X67	Shutter selector spring	1	46000-00063
X68	Manual lever spring	1	46000-00064
X69	Restitution spring	2	
0 -X100	Synchro terminal assembly (X100, X101, X102, X103)	1	
X300	Lens shutter	1	

LIST OF STANDARD PARTS

Product No. 46110
SUPER-MULTI-COATED TAKUMAR 6×7 1:2.8 90mm

Description	Surface treatment	Position of use	Quantity
FM 1.4 x 1.4	Black nickel	X25, X64	1
FM 1.4 x 2.2	,,	X55, X61	1
CNM 1.4 x 2.5	,,	X14, X49	2
		X16, X52	1
		X17, X62	2
		X21, X50	2
		X21, X54	2
		X22, X56	2
CNM 1.4 x 3.0	,,	X11, X12	4
		X21, X33	1
CNM 1.7 x 3.0	,,	X10, X300	3
		X10, X58	2
		X10, X59	2
CSS 1.4 x 2.2	,,	X201, X202	4
CSS 1.7 x 3.0	,,	X10, X12	3
CSM 1.4 x 2.5	,,	X26, X27	3
CSM 1.7 x 3.5	,,	X19, X25	3
CRS 1.4 x 3.0	,,	X10, X15	3
Set T 1.4 x 2.2	,,	X19, X24	3
Set T 1.7 x 2.8	,,	X18, X20	3

Ball:

Description	Meterial	Diameter	Position of use	Quantity
BO 2	Steel	2 mm	X11, X17, X25	3

SERVICE MANUAL

Product No. 46110
SUPER-MULTI-COATED TAKUMAR 6×7 1:2.8 90mm

TABLE OF CONTENTS

A Characteristic features

B. Disassembly

C. Reassembly

D. Adjustment

E. Servicing Tools and Lubricants

A. Characteristic features

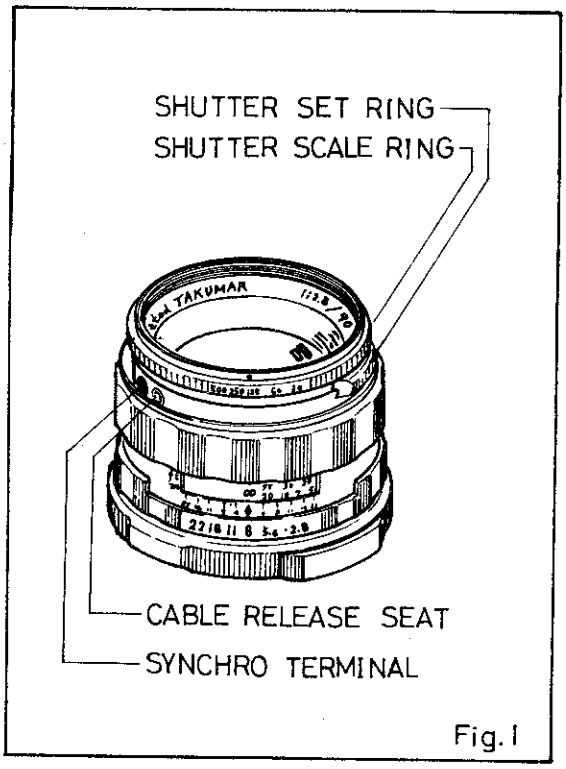


Fig. 1

This lens is designed mainly for the following purposes.

1. High speed shutter synchronization with electronical flash/Super-Lite) or flush guns.

2. Multiple exposures

And also this lens is available for normal taking pictures.

Regarding to the operations and specifications , refer to Catalog of Super-Multi coated TAKUMAR 90mm f 2. 8.

B. Disassembly

In this item, the following procedures show the way how to disassemble the lens up to Lens shutter part(X300).

As the other rest of the parts are taken out in the same way with other 6X7 lenses, so these explanations are not mentioned here

---The procedures---

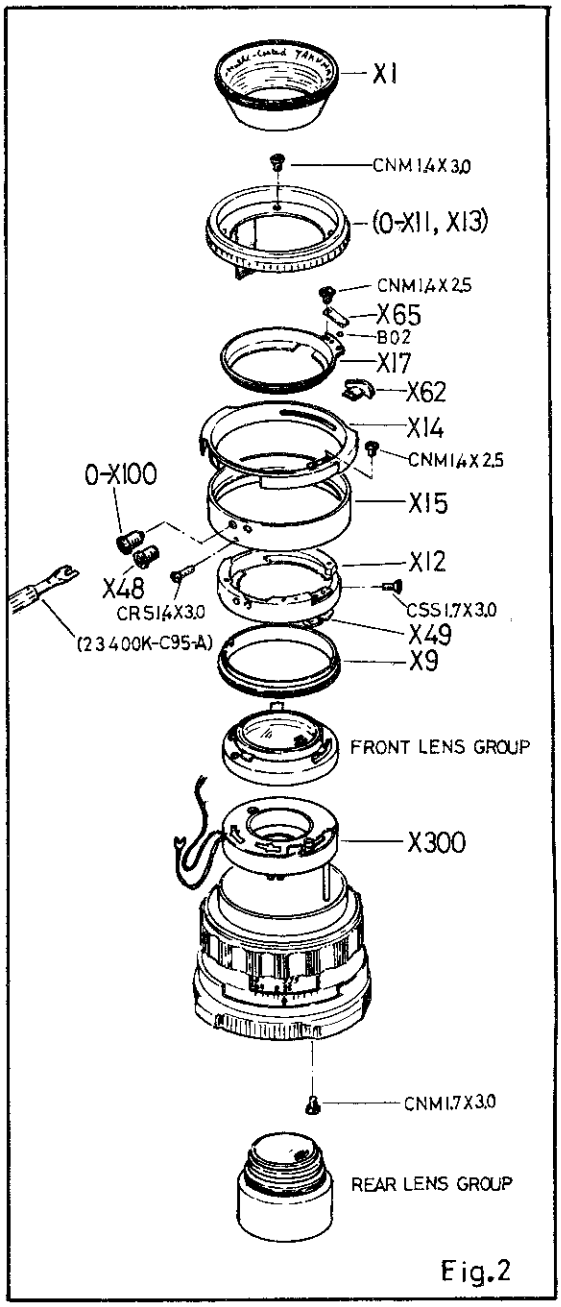


Fig.2

1. Take out Nameplate ring(X1) with Nameplate ring remover(62φ).

2. Remove the four retainer screws (CNM1.4X3.0) of Cover ring assembly(0-X11).
Lift off (0-X11) and Shutter scale ring (X13)' together.

3. Remove the two screws(CNM1.4X2.5) of Shutter selector lever(X62), Click spring(X65) and steel ball(B02).

4. Remove the two screws of Shutter set ring(X17).

5. Set Distance scale ring(X20) at shortest distance, unsolder Red lead wire from Synchro terminal(0-X100) and unscrew Lead wire install screw(X36) a little bit pulling Black lead wire tip from underneath the Lead wire install screw(X36)

6. Remove the three black painted screw (CRS1.4X3.0) and lift off Ornament ring(X15).

7. Remove three saucer screws(CSS1.7X 3.0) and lift off Supporter ring(X12) and other attached parts.

8. Unscrew Front frame retainer ring(X9) with Adjustable spanner"AK-2-LA" and lift it off.

9. Lift off Front lens group and take out Rear lens group.

10. Remove the three retainer screws(CNM1.7X3.0) of Lens shutter(X300) from bottom part of lens and lift off Lens shutter (X300).

The rest of the parts are taken out in the same way with other 6X7 lenses.

"Notice"
If trouble occurs in Lens shutter itself, replace it with new one, and faulty lens shutter is sent to the factory.

C. Reassembly

The procedures of reassembly are not mentioned here.
Because they are quite opposite to those of Disassembly.

The following explanations show some notices to take care.

---Explanations---

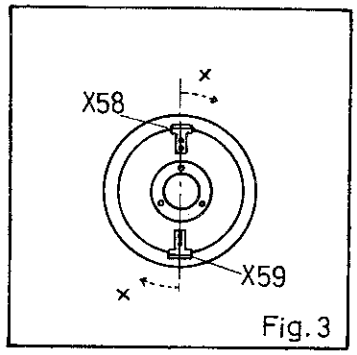


Fig.3

1. Helicoid guide plates(X58, X59).

If these parts are installed wrongly, aperture of lens varies in each f stop. Especially, if both parts(X58, X59) are installed bending in the direction of arrow, diaphragm blades do not open fully at full aperture after installing Lens shutter(X300).
Both parts should be installed straight so that Main barrel assembly(0-X10) turns smoothly.
In repair, it is desirable not to take out them simultaneously.

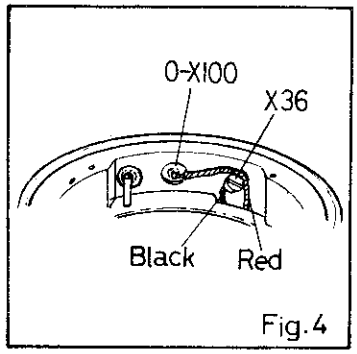


Fig.4

2. Lead wires of Lens shutter(X300)

Black lead wire comes underneath Lead wire install screw(X36) and retained with it.
Red lead wire is soldered to Synchro terminal assembly(0-X100).
Quick soldering id desirable.

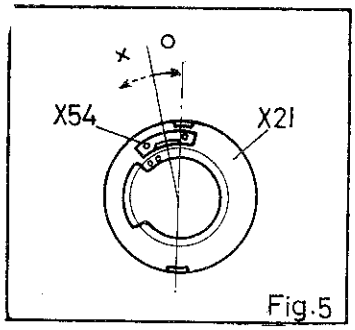


Fig.5

3. Diaphragm turning plate(X54)

Diaphragm turning plate(X54) should be installed pulling in the direction of arrow. (Refer to Fig. 5).
It is because to prevent a trouble of visible diaphragm blades at full aperture.

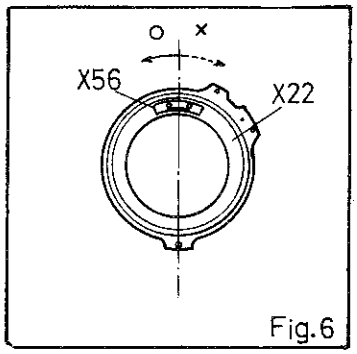


Fig.6

4. AM selector plate(X56)

AM selector plate(X56) should be installed pulling in the direction of arrow. (Refer to Fig. 6).

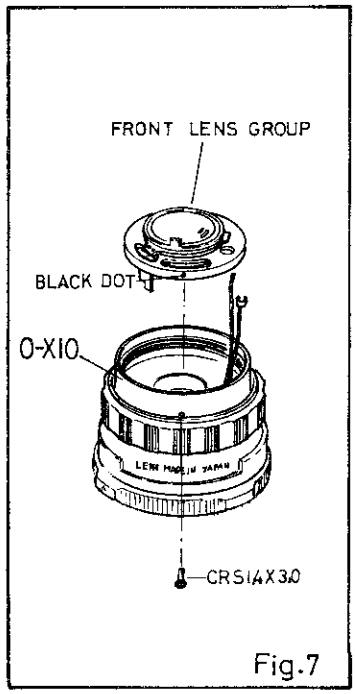


Fig.7

5. Front lens group

When front lens group is installed see the black dot on the Front lens group and the small screw hole of Main barrel assembly(0-X10).

Install front lens group to Main barrel assembly fitting those remarks .
Retain Front lens group with the black painted screw(CRS1. 4X3. 0) temporarily.
Install Front frame retainer ring(X9) with Adjustable spanner"AK-2-LA".

After having fastened (X9), remove the temporarily fixed screw(CRS1. 4X3. 0).

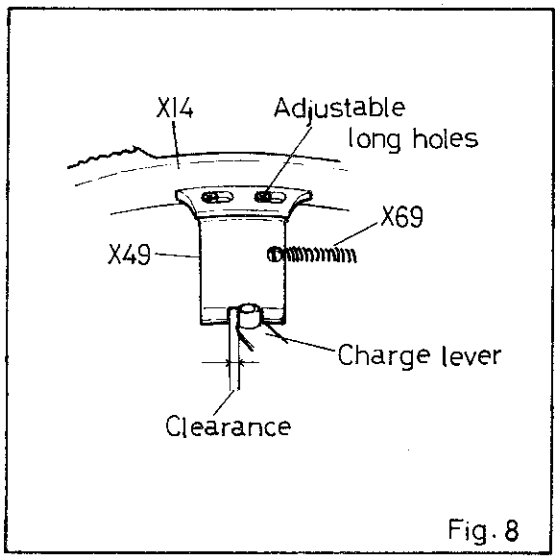


Fig. 8

6. Shutter set ring(X14)

Shutter set ring(X14) has the two adjustable long holes used for adjusting the positions of Shutter set lever (X49). (Shown in Fig. 8.)

As Fig. 8 shows, clearance is important. Because, after cocking lens shutter, Shutter set lever(X49) turns back to the original position by the tension of Restitution spring(X69), and if no clearance is there, Shutter set lever pushes charge lever of Lens shutter(X300) over beyond the original position and causes the damages of Lens shutter(X300).

D. Adjustment

1. Focus adjustment
   The same adjustment with the other 6X7 lenses.

2. Aperture adjustment
3. Lens shutter speed adjustment
   These two adjustments are not neccessary in servicing. If some trouble happens in Lens shutter(X300), replace it with new one.

E. Servicing Tools and Lubricants

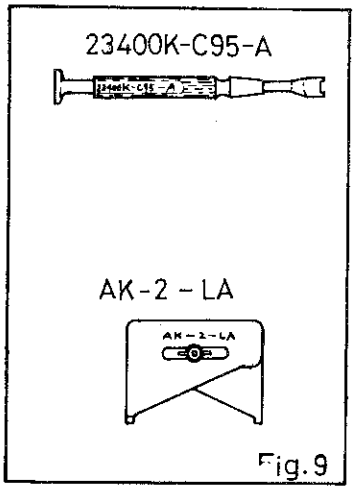


Fig. 9

1. Tools

23400K-C95-A(Tool of 6X7 camera)

Adjustable spanner AK-2-LA

Nameplate ring remover(62Ø)

And drivers, tweezers, soldering iron etc.,

No exclusive tools are used.

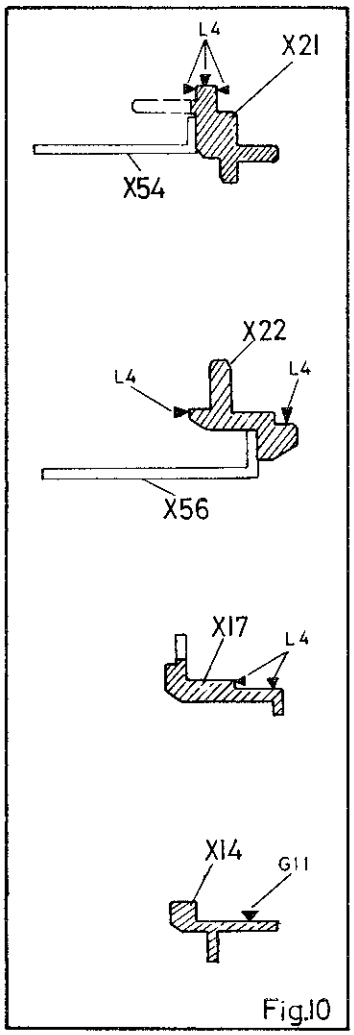


Fig.10

2. Lubricants

*G4dk
*L4
*G11

G4dk is applied to the Helicoid threads.

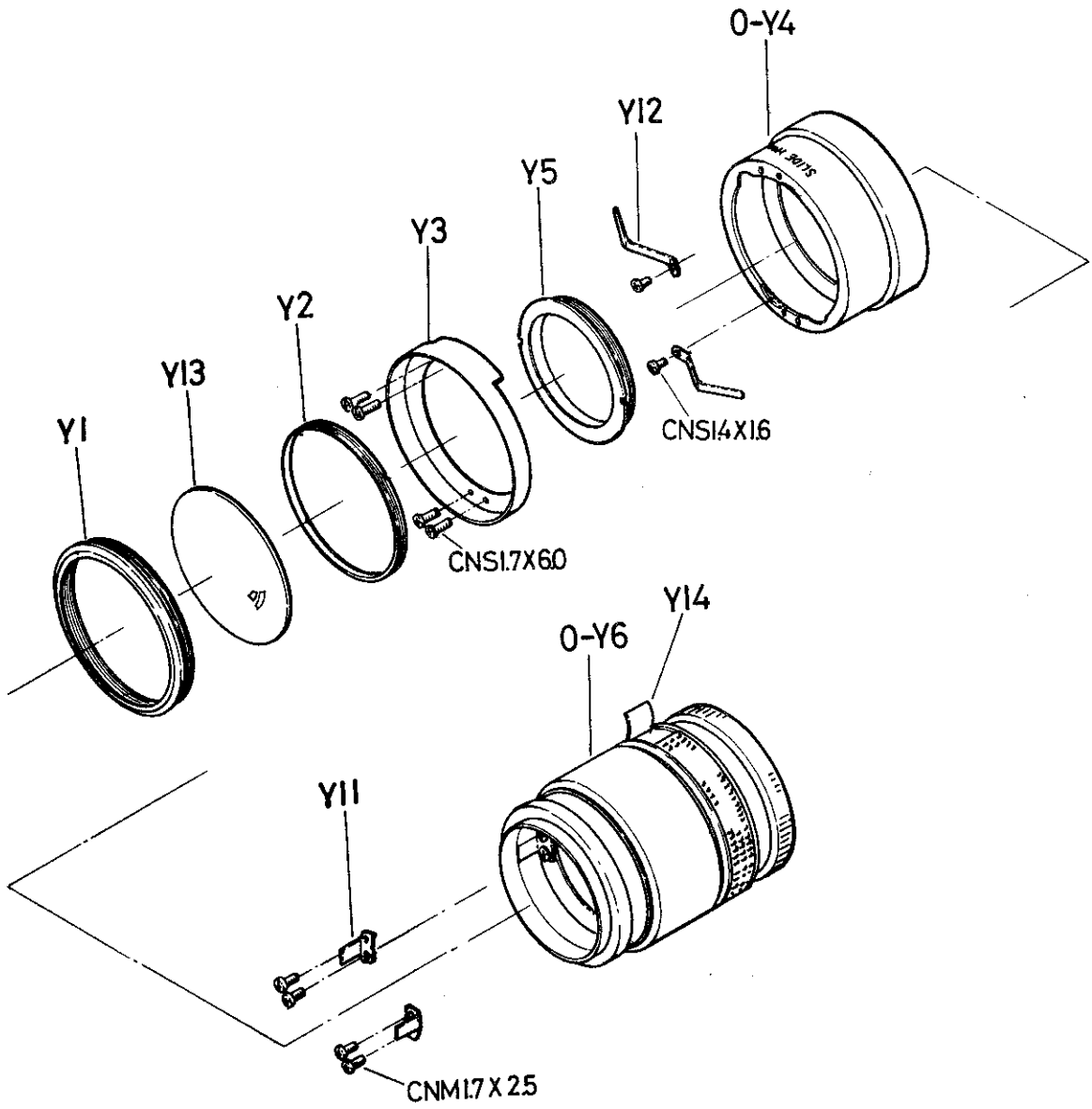
L4 and G11 are applied in the part shown in Fig. 10.

Do not apply too much lubricants.

PRODUCT No. 70046

SLIDE HOLDER

EXPLODED ILLUSTRATION



Product No. 70046

SLIDE HOLDER

LIST OF SERVICE PARTS

Product No. 70046
SLIDE HOLDER

Note; 1. The parts with numbers starting with '0-' are assembled parts.

2. Only available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y1	Diffusion plate installing frame	1	
Y2	Diffusion plate retainer ring	1	
Y3	Slide frame	1	
0-Y4	Spring installing frame assembly(Y4, Y9)	1	
Y5	Installing frame retainer ring	1	
0-Y6	Coupler ring assembly (Y6, Y7, Y8, Y10, Y11x2, Y14, CNM1.7x2.5x4)	1	
Y11	Helicoid guide plate	2	46000-X56
Y12	Spring	2	
Y13	Diffusion plate	1	
Y14	Rubber	1	

LIST OF STANDARD PARTS

Product No. 70046

SLIDE HOLDER

Small screws;

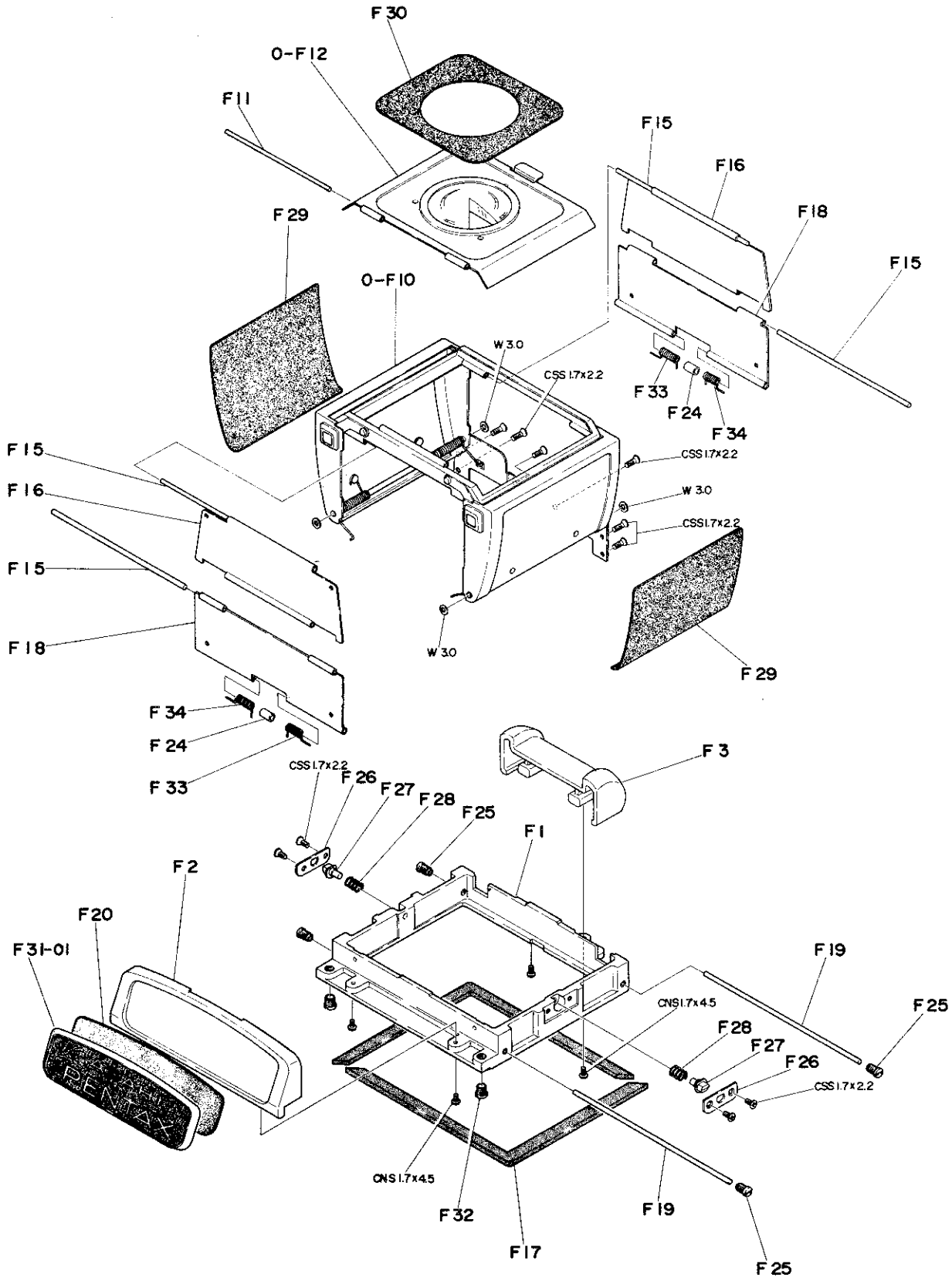
Description	Surface treatment	Position of use	Quantity
CNS1.4x1.6	Black nickel	Y4, Y12	2
CNM1.7x2.5	"	Y8, Y11	4
CNS1.7x6.0	"	Y3, Y4	4

PRODUCT No. 71002

6×7 WAIST LEVEL FINDER

12 : 73 : 3 H

EXPLODED ILLUSTRATION



Product No. 71002

6×7 WAIST LEVEL FINDER

LIST OF SERVICE PARTS

Product No. 71002
6×7 WAIST LEVEL FINDER

Note: 1. The parts with numbers starting '0-' are assembled parts.
2. Only available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
F1	Body	1	
F2	Nameplate frame	1	
F3	Rear handle	1	71004–Y3
0-F10	Finder frame assembly (F10, F4x2, F5x4, F6x2, F7x4, F8x4, F9x4, F21, F22, F23x2, F35x2, F36x2, W42x4)	1	
F11	Eyepiece shaft	1	
0-F12	Eyepiece assembly (F12, F13, F14x3, L1)	1	
F15	Light seal plate shaft A	4	
F16	Light seal plate, top	2	
F17	Cushion	2	70034–P17
F18	Light seal plate, bottom	2	
F19	Light seal plate shaft C	2	
F20	Nameplate attach sheet	1	70034–P18
F24	Spring spacer	2	
F25	Light seal plate receptacle	4	
F26	Lock pin guide	2	
F27	Lock pin	2	
F28	Lock pin spring	2	
F29	Top covering	2	
F30	Eyepiece frame covering	1	

Parts No.	Description	Quantity	Interchangeability
F31-01	Nameplate	1	70034–P4
F32	Finder positioning guide	2	70034–P34
F33	Light seal plate spring A	2	
F34	Light seal plate spring B	2	

LIST OF STANDARD PARTS

Product No. 71002
6× 7 WAIST LEVEL FINDER

Small screws:

Description	Surface treatment	Position of use	Quantity
CSS1.7 x 2.2	Black nickel	F1, F26	4
		F1, F21	3
		F1, F22	3
CNS1.7 x 4.5	Black nickel	F1, F2	2 2
		F1, F3	2

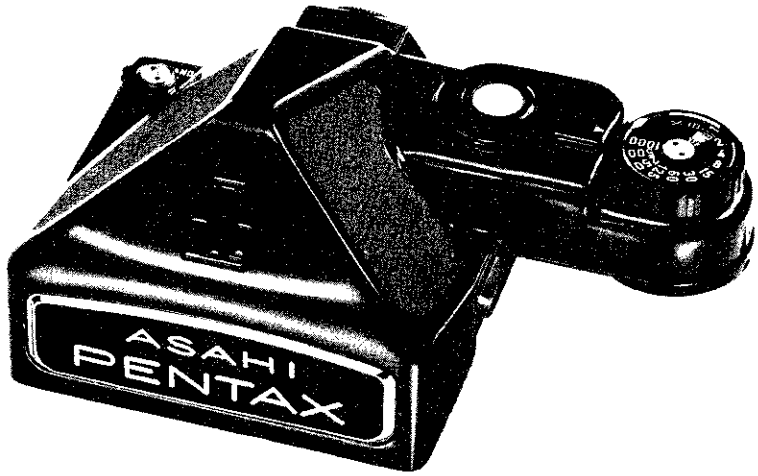
Washers:

Description	Material	Thickness	Position of use	Quantity
W3	Phosphor bronze	0.3, 0.6 mm	F23	4
W42	Phosphor bronze	0.6 mm	F7	4

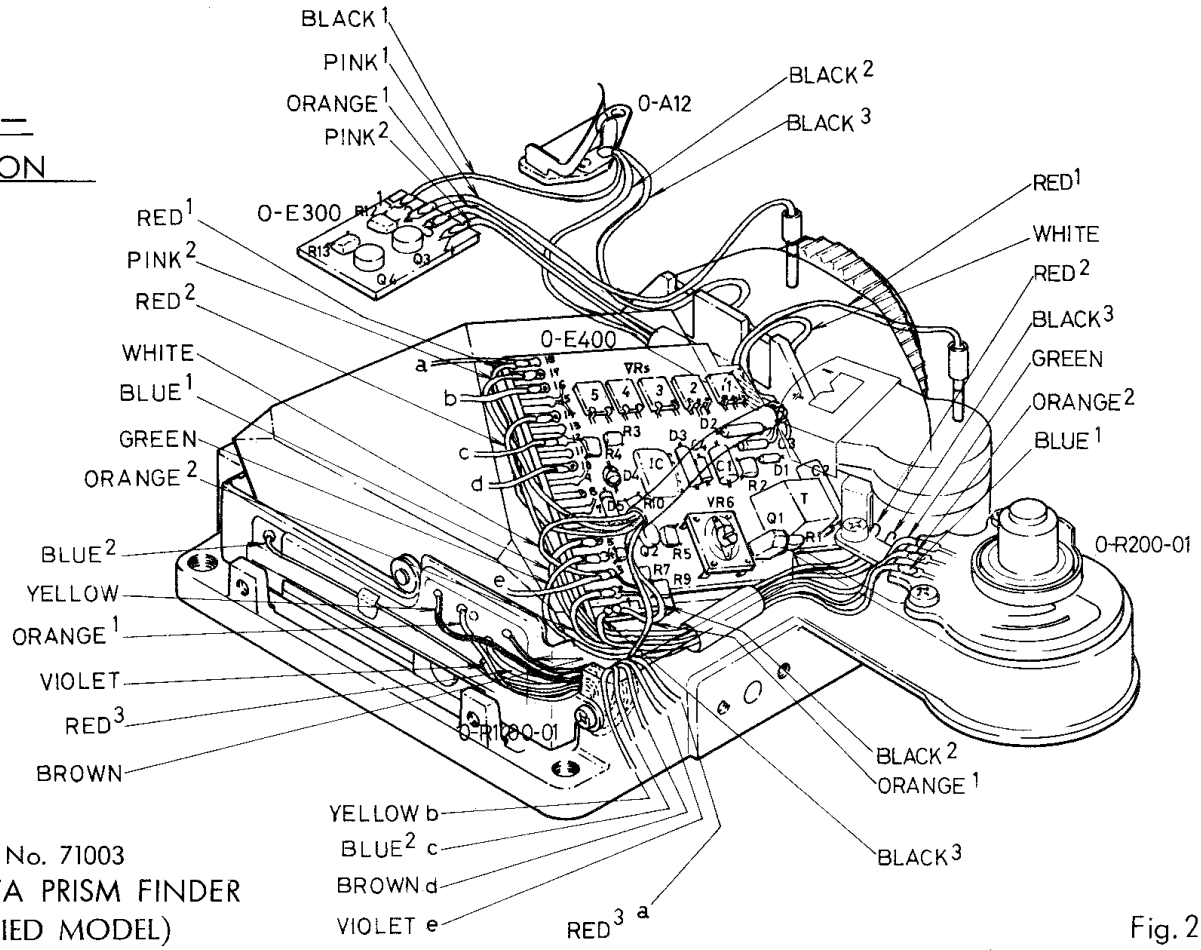
PRODUCT No. 71003

T. T. L PENTA PRISM FINDER

(MODIFIED MODEL)



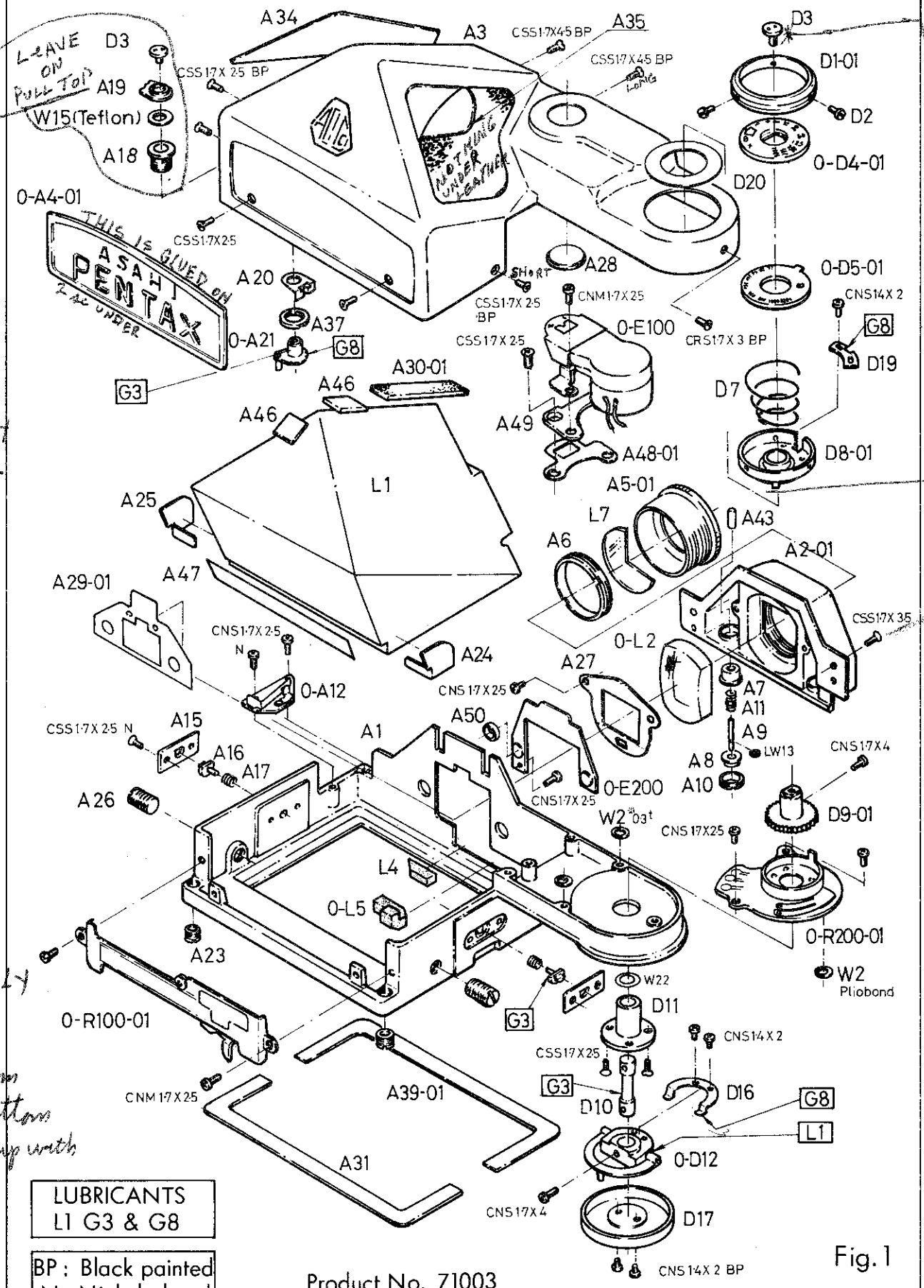
WIRING — —
ILLUSTRATION



Product No. 71003
T.T.L. PENTA PRISM FINDER
(MODIFIED MODEL)

Fig. 2

EXPLODED ILLUSTRATION



LUBRICANTS
L1 G3 & G8

BP : Black painted
N : Nickel plated

Product No. 71003

Fig. 1

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

71003 SCHEMATIC DIAGRAM

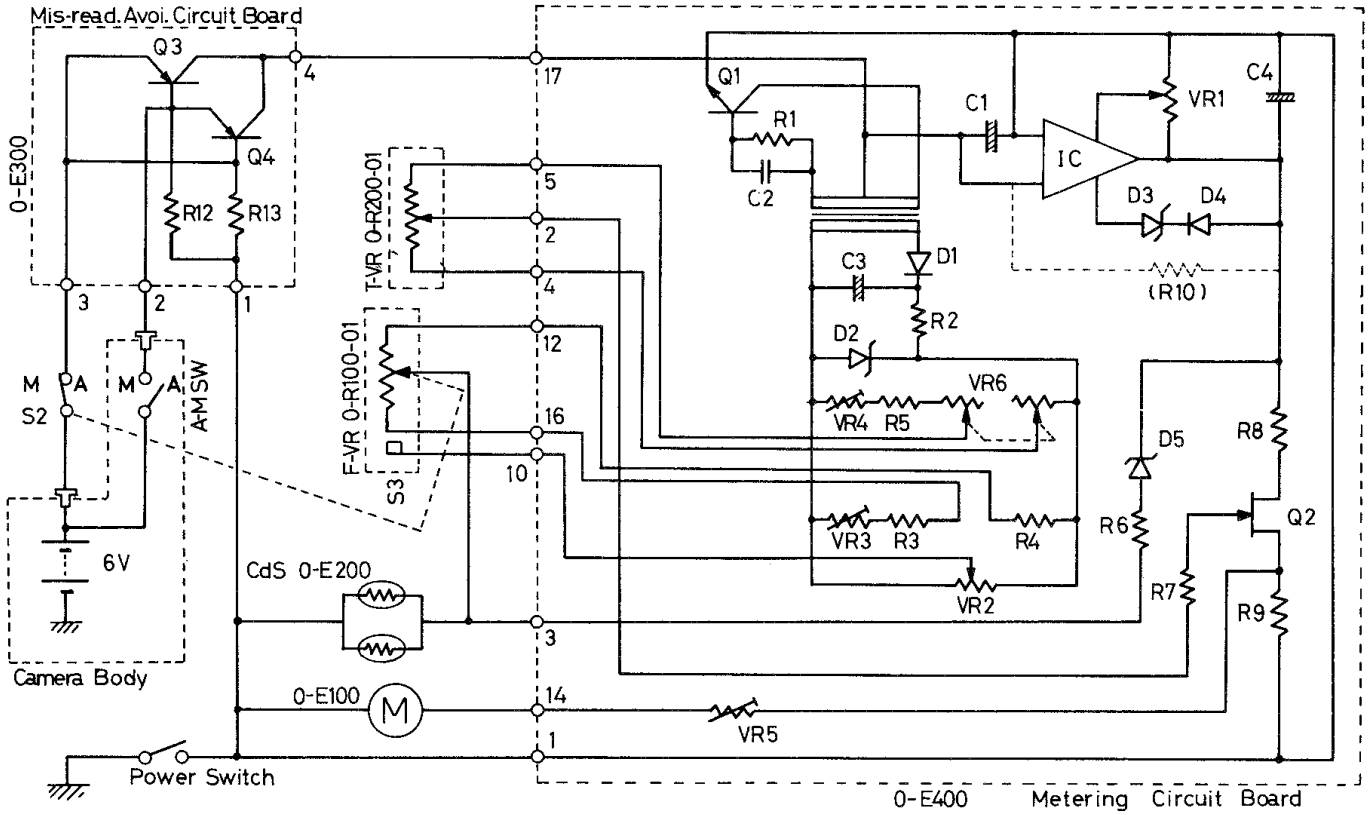


Fig. 3

Product No. 71003

Metering Switches : positioned in Full-Aperture Metering.

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

LIST OF SERVICE PARTS

Product No. 71003
T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

1. The parts with numbers starting "0-" are assembled parts.

Parts No.	Description	Quantity	Interchangeability
A 1	Prism seat (Frame)	1	
A2-01	Eyepiece housing	1	
A3	Top cover	1	
0-A4-01	Nameplate (A4, A44)	1	70034-P4
A5-1	Eyepiece ring	1	70034-P15
A6	Eyepiece lens retainer ring	1	70034-P16
A7	Terminal insulation tube	2	
A8	Terminal insulation collar	2	
A9	Terminal contact	2	
A10	Terminal nut	2	
A11	Terminal spring	2	
0-A12	Main SW seat assembly (A12, A13, A14, A32, A33, A38x3)	1	
A15	Lock pin guide	2	
A16	Lock pin	2	71002-F27
A17	Lock pin Spring	2	
A18	Main SW tube	1	
A19	SW handle	1	
A20	Click spring	1	
0-A21	Click plate assembly (A21, A22, A36)	1	
A23	Viewfinder guide receptacle	2	

Parts No.	Description	Quantity	Interchangeability
A24	Prism protector A	1	70034-P8
A25	Prism protector B	1	70034-P7
A26	Prism retainer screw	2	70034-P10
A27	Lens retainer plate	1	
A28	Meter window	1	
A29-01	Prism protector sheet, rear	1	
A30-01	Prism protector cushion, large	1	70034-P19
A31	Prism cushion A	1	
A34	Covering right	1	
A35	Covering left	1	
A37	Main SW tube nut	1	
A39-01	Prism cushion B	1	
A46	Prism protector cushion, small	2	
A47	Prism protector sheet, front	1	
A48-01	Gate mask	1	
A49	Meter installation plate	1	
A50	CdS collar	1	
D1-01	Shutter dial	1	
D2	Dial installing screw	3	23102-05100
D3	Dial retainer screw	2	
0-D4-01	Dial plate assembly (D4, D18)	1	
0-D5-01	ASA dial assembly (D5, D6, CNS 1.2x1.4)	1	
D7	Dial spring	1	
D8-01	Dividing claw	1	
D9-01	Dividing gear	1	

Parts No.	Description	Quantity	Interchangeability
D10	Dial shaft	1	
D11	Dial shaft receptacle	1	
0-D12	Bottom dial receptacle assembly (D12, D13, D14, D15)	1	
D16	Connector plate spring	1	
D17	Dial bottom cover	1	
D19	T-VR positioner plate	1	
D20	Duster ring	1	
0-E100	Ammeter	1	
0-E200	CdS cell assembly (E2x2, E3)	1	
0-E300	Mis-reading avoidance circuit board	1	
0-E400	Metering circuit board	1	
E21	C. board attaching tape	5	
L1	Pentaprism	1	70034-L1
0-L2	Eyepiece lebs assembly (L2. L3)	1	
L4	11° prism	1	
0-L5	Porlo prism (L5x2, L6)	1	
L7	Protection glass	1	
0-R100-01	F-VR (R101 ~ R103, R106 ~ R118)	1	
0-R200-01	T-VR (R201 ~ R207)	1	

LIST OF STANDARD PARTS

Product No. 71003

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

Description	Surface	Position of Use	Quantity
CSS 1.7 x 2.5	Black Nickel	D11, A1	3
	Nickel Plated	A15, A1	4
	Black Painted	A3, A1	5
	Black Nickel	A49, A48, A1	2
CSS 1.7 x 3.5	"	A1, A2	2
CSS 1.7 x 4.5	Black Painted	A3, A2, A1	2
CNS 1.2 x 1.4	Black Nickel	0-D5	1
CNS 1.4 x 2	"	D19, D8	2
	"	D16, D12	2
	Black Painted	D17, D12	2
CNS 1.7 x 2.5	"	A12, A1	1
	"	R200, A1	3
	"	A27, A2	1
	"	E2, A1	1
CNS 1.7 x 2.5	Nickel Plated	A12, A1	1
CNS 1.7 x 4	Black Nickel	D10, D12	1
	"	D9, D10	1
CNM 1.7 x 2.5	"	R100, A1	2
	"	E1, A49	2
CRS 1.7 x 2.0	Black Painted	A3, A1	1

Description	Material	Thickness	Position of Use	Quantity
W2	Phosphor Bronze	0.3mm	R100	3
W15	Teflon	0.2mm	A19	1
W22	Phosphor Bronze	0.1mm	D11	1
LW 13	Steel		A9	2

LIST OF SPECIAL SERVICING TOOLS

Product No. 71003

T.T.L. PENTA PRISM FINDER (MODIFIED MODEL)

Description		Position of Use
23400K-A33-A	6 x 7 cameras	D3
23400K-C95-A	"	A10
Adjustable Spanner AK3-LA		A6

Remark:

No exclusive tools are used with T. T. L. FINDER

TTL PENTA PRISM FINDER (Prod. No. 71003) MANUAL
(MODIFIED MODEL)

1 General Description

This TTL Penta Prism Finder for Pentax 6x7 camera operates in full-aperture metering when used with full-aperture metering lenses having a f/stop coupler to the camera body. When used with other lenses not having the coupler or in state where the coupler is inoperative, stop-down metering will be automatically selected upon fitting the lenses. Stop-down metering with a full-aperture metering lens will be enjoyed by ①disengaging f/stop coupling between the TTL and the camera body and ②selecting the lens's preview lever to "Man" position. Mis-metering will be checked by means of an incorporated mis-reading avoidance circuit (acts like a power switch) which comes "off" when metering mode selector switches are wrongly actuated.
Metering is of Zero-method type with indication needle that trips about 2EV from 0 toward "+" and over 3EV toward "-", and the needle will be invisible when deflected beyond 3EV toward "-". When the power is off, the needle rests at fully tripped position toward "+".
The TTL draws power from Camera's battery and consumes about 4mA for operation, requiring the power switch to be turned off after metering to prolong battery life. The minimum power voltage for normal operation is rated 4.5V or lower. Use camera's battery checker for battery check.

2 Circuit Description

General

Information from CdS resistor cells (so-called "CdS") is *1 log-compressed by D5 to obtain a photographic calculation input of which value varies by a certain value for every 1EV variation of photographing subjects.
Calculation takes place in a kind of a so-called bridge circuit consisting of F-VR, T-VR etc., and the answer (the output of this calculator circuit or the bleeded potential of the potentiometer T-VR) is indicated on an ammeter via. Field Effect Transistor (Q2).
Most electronic components are arranged on the two circuit boards: a metering temperature-compensated ——— and a mis-reading avoidance circuit board. For repair, each should be replaced in a unit; replacement of individual component especially on the metering circuit board is basically prohibited.

Mis-reading avoidance circuit

A power switching circuit consisting of Q3, Q4 etc. to shut off the power when metering switches (shown as S2, S3 and A-M SW in the schematic-diagram) are wrongly selected like when A-M switch is selected "M" while S2 being closed (that is, f/stop couplings are engaged). Thus any false metering is warned by a dead needle.
On normal operation in which either one of A-M switch or S2 is closed, this switching circuit comes "ON" with a voltage drop (voltage loss) less than 0.1V. When both switches are wrongly closed, no forward bias to Q3 and Q4 will be produced, modulating those silicon transistors into high impedances.

Automatic voltage regulator (AVR)

To counteract variation of the power output (BATT), two AVRs are provided: a calculator power source consisting of Q1, T1 etc. and a 4-volt regulator (3.5 ~ 4.5V in the practical circuits) consisting of Hybrid IC, D3, D4 etc..
The calculator AVR is an insulated power source obtained from 130KHz oscillator transformer, and regulated to 6~7V DC by D1 and D2 (Zener type).

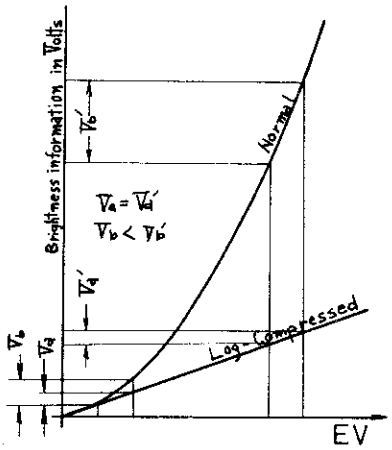
Metering Calculation circuit

*1 Log-compressed CdS's information is fed into the calculator as a log-compression output of which voltage varies by about 100mV per a 1EV variation (called a unit voltage variation against a unit EV variation) of photographing subjects. Under usual brightness, this output level will be around 1V, falling when EV advances, rising when lowers. Note that with advancing EV, the output voltage (samely a calculator output) grows lower resulting in a needle deflection toward "+".

Calculator is a voltage-based calculation bridge, consisting of F-VR at input, T-VR at output, and others. An ultimate high input impedance element, FET follows this high impedance calculator as a impedance buffer to ensure correct metering. Calculator circuit adjustment should be so made by resistors (rheostats) as to allow the potentiometers F-VR and T-VR to produce a unit voltage variation (of about 100mV as given previously) when F-VR or T-VR receives 1EV mechanical movement. As in Pentax SP, shutter speed and film speed are mechanically culculated, the result being reflected on T-VR setting. Others are electronically processed according to *2Apex method.

As found, the calculation is to find an adequate degree of voltage level shift that developes a certain reference gate voltage of the FET under a given photographing condition. A dual rheostat (VR6) is provided to establish meter level.

*1 Logarithmic Compression



Information from CdS resistor cells (impedance variations) varies over wide range since brightness of photographing subjects varies according to the equation $B=K2^{EV}$ Where B is brightness and K is a constant , showing B is proportional to 2^{EV} which varies by powers of EV. By taking advantage of Log-compression, this is coverted into a voltage variation which equally varies against unit EV variation over operating range of from EV19 to EV2.5 (with standard lens and ASA 100 film) or beyond. This enables the circuit to operate with Apex method, significantly reducing its operating dynamic range. Same idea has been employed in Pentax ES.

*2 Apex Method

One of the photographic calculation methods, attained through only addition or subtraction. f/stop, Brightness (EV), film speed and shutter speed being evaluated in each Apex Numbers as Av, Bv, Sv and Tv respectively, a proper exposure is defined in the following equation in the Zero-method.

$$Bv' - Av + Sv - Tv = 0 \text{ (needle's indication)} \text{ -------(1)}$$

In this unit, however, Sv and Tv are mechanically processed. Equation (1) can be re-written as follows:

$$Bv - Av + T'v = 0 \text{ ---------- (2)}$$

3 Notice For Servicing

[A] Parts:

Matching of CdS(0-E200) and Metering Circuit Board (0-E400)

E400 has a color marking of ①Red ②Yellow ③Blue ④White at the spot shown in Fig3-1, and E200 has a digit marking of from 1 to 8,according to their operating charactristics.
E200 and E400 should be used in combination shown in Fig3-1.

Ammeter(0-E100) Installation

Install E100 so that it's metering-reference-gate comes right into the position within the metering image zone as shown in Fig3-2. Gate-Mask (A48) should be so fixed as not to vignette the gate area.

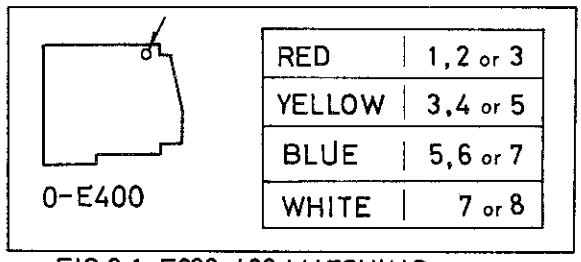


FIG 3-1· E200·400 MATCHING

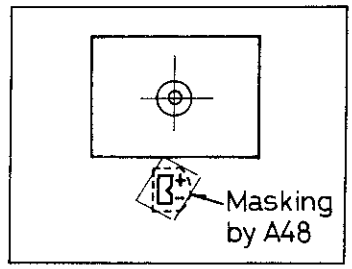


FIG 3-2 METERING-REFERENCE-GATE IMAGE

Replacement of ASA Dial (0-D5-01)

Dial plate position of D5 must be adjusted along with a camera body engaged to secure T-VR operating range of from ASA32:1/1000 down to ASA100:1. Ensure that T-VR's slider contact remains within the resistor area (shown in Fig3-3) when the above margin is set.

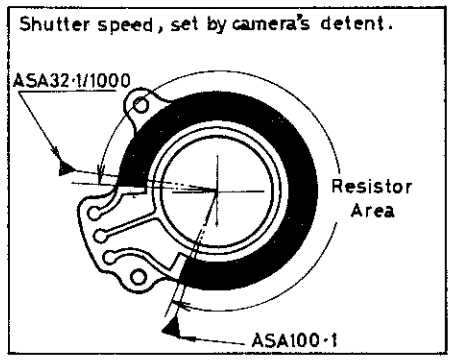


FIG 3-3 Resistor Area Of T-VR

Installation Of Metering Circuit Board
(0-E400)

E400 should be fixed into the position shown in Fig3-4 by use of both-side-surface adhesive tapes in order to maintain proper clearance to Top Cover(A3).

Metering Image Transfer Prisms
(L4, 0-L5)

Cemedine 3000H (adhesive) can be used for bonding. Prisms should have at least clearance to Pentaprism to release the danger of prism failure upon impact.

Wirings

Wirings should be unsoldered at the circuit board side's end.

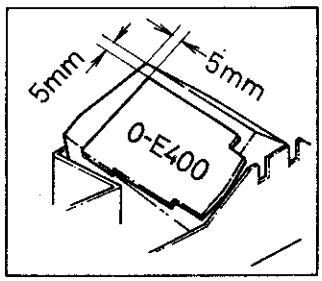


FIG 3-4
CIRCUIT BOARD(0-E400) INSTALLATION

[B] Repair

Inoperative Metering Needle

Ensure that f/stop coupling is made ; Preview lever is set at "Auto".

1 Power Circuit Check

a Camera body
See whether the battery output appears on the power coupler terminals, as shown in Fig3-5.

b Metering Switch
See whether S2 of F-VR is conducting.

c Mis-reading Avoidance Circuit (0-F300)

d Power Switch (S1)

e Metering Circuit Board (0-E400)

Power Coupler Terminals

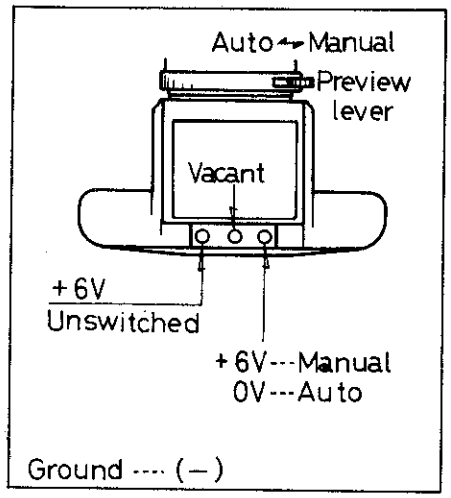


Fig3-5.

2 Ammeter Check
Ammeter needle reaches "zero-point" when about 90mV is applied, a 7mV-variation makes 1EV needle deflection.

3 Calculator Circuit Check
See the next.

Invisible Needle Regardless of EV

If the needle stays invisible regardless of metering operation as far as the power is "on", check the calculator circuit.

1 Wiring Check: between the circuit board and F-VR or T-VR.

2 Potential Check
(Use volt-meter with high input impedances, higher than 3MΩ)

The needle will show the "zero" when FET(Q2) gate receives around 0.3V. V_m will be found around 1V under usual brightness, say EV12. V_1 and V_2 checks may help to locate the cause.

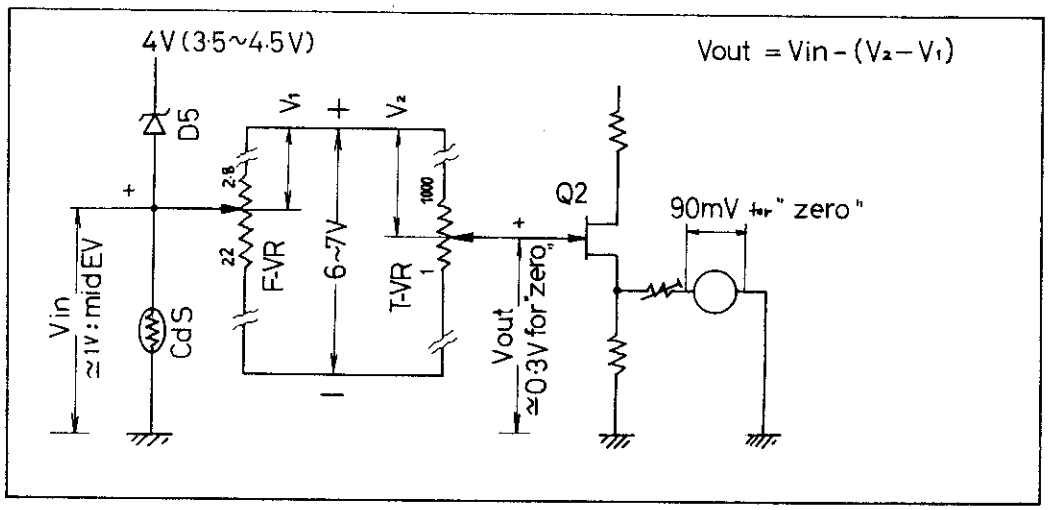
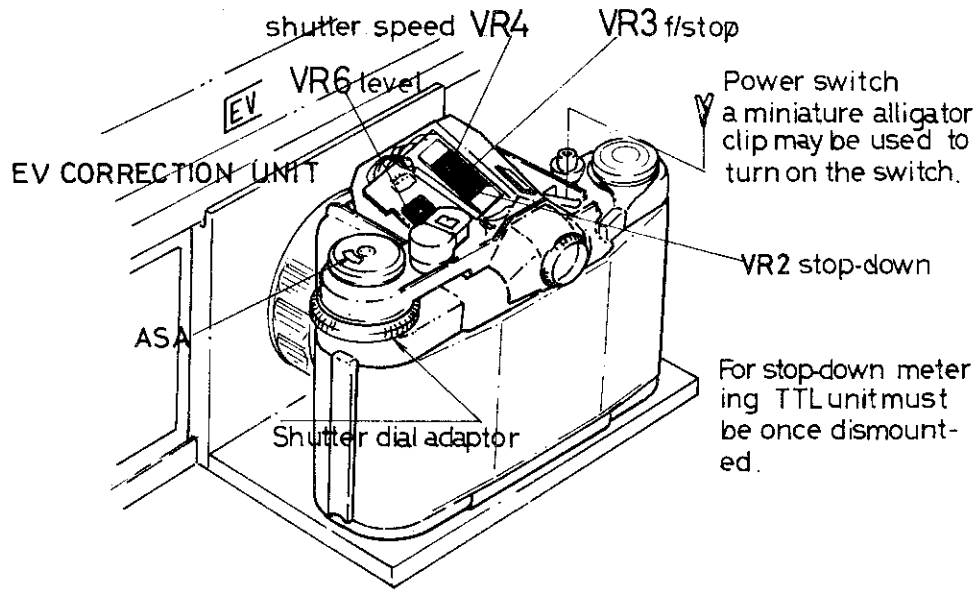


Fig3-6 Calculator Circuit Check

4. Metering Calibration

FIG 4-1



Calibration is made with a 6x7 camera and standard lens fitted.

CHECK POINT TABLE ASA 100 FIG 4-2

FULL-APERTURE METERING

EV	16	12	12	8	4
SHUTTER SPEED	1000	60	500	4	2
f/STOP	8	8	2·8	8	2·8

STOP-DOWN METERING

16	12	8	4
1000	60	4	2
8	8	8	2·8

: f/stop-error-imposed reading

Resistors to be adjusted:

Full-aperture metering

VR3	(Rheostat)	f/stop calculation adjustment
VR4	(〃)	Shutter speed and ASA 〃
VR6	(Dual rheostat)	Meter leveling , (also effective in stop-down metering's)

Stop-down metering

VR2	(Potentiometer)	Meter leveling

NOTE: Do not touch other VRs, since their re-settings will not be established by other than factory service.

CAUTION
Due to the circuit property, an adjustment will induce variations in the subsequent adjustments. The following steps should be carefully observed.

FULL-APERTURE METERING

Adjustment steps:

1 Ensure that f/stop coupling is properly made between the TTL unit and the camera;the preview lever is set at "Auto".

2 Turn on the power switch.

3 Check metering indications in the following sequence.

1	at EV16	with f/8	; 1/1000 sec.
2	EV8	f/8	; 1/4
3	EV12	f/2.8	; 1/500
4	EV4	f/2.8	; 1/2

a If readings are evenly high (+), } adjust VR6 to recover a correct
b 〃 low (-), } metering level.
c 〃 scattered, perform the following steps.

---

4 Match the needle to the "zero"at EV16 with f/8 ;1/1000 sec. by adjusting VR6.

---

5 Check the reading at EV8 with f/8 ; 1/4.
a If it is high (+), increase VR4, and see Step 6.
b 〃 low (-), decrease 〃
c 〃 right on, skip to Step 7.
(First application should be so made to a small extent as to find how it develops the result.)

6 Step4 and 5 should be repeated until an adequate adjustment has been made.

---

7 Check at EV12 and EV4 with f/2.8;1/500 and f/2.8 ;1/2 respectively.
a If the two readings are high (+), increase VR3, and see Step 8.
b 〃 low (-), decrease 〃
c 〃 right on, skip to Step 9.
(Adjustment can be made in the same manner as in Step 5. A small difference may exist between the two readings as an error)

8 Return to Step 4, and repeat Step 4 and Step 7, until an adequate adjustment has been made.

---

9 Establish a correct metering level by adjusting VR 6.

10 Check at each check point shown in Table, Fig4-2 .

STOP-DOWN METERING

Adjustment steps:

1 Ensure that f/stop coupling is disengaged ; the preview lever is set at "Man ".

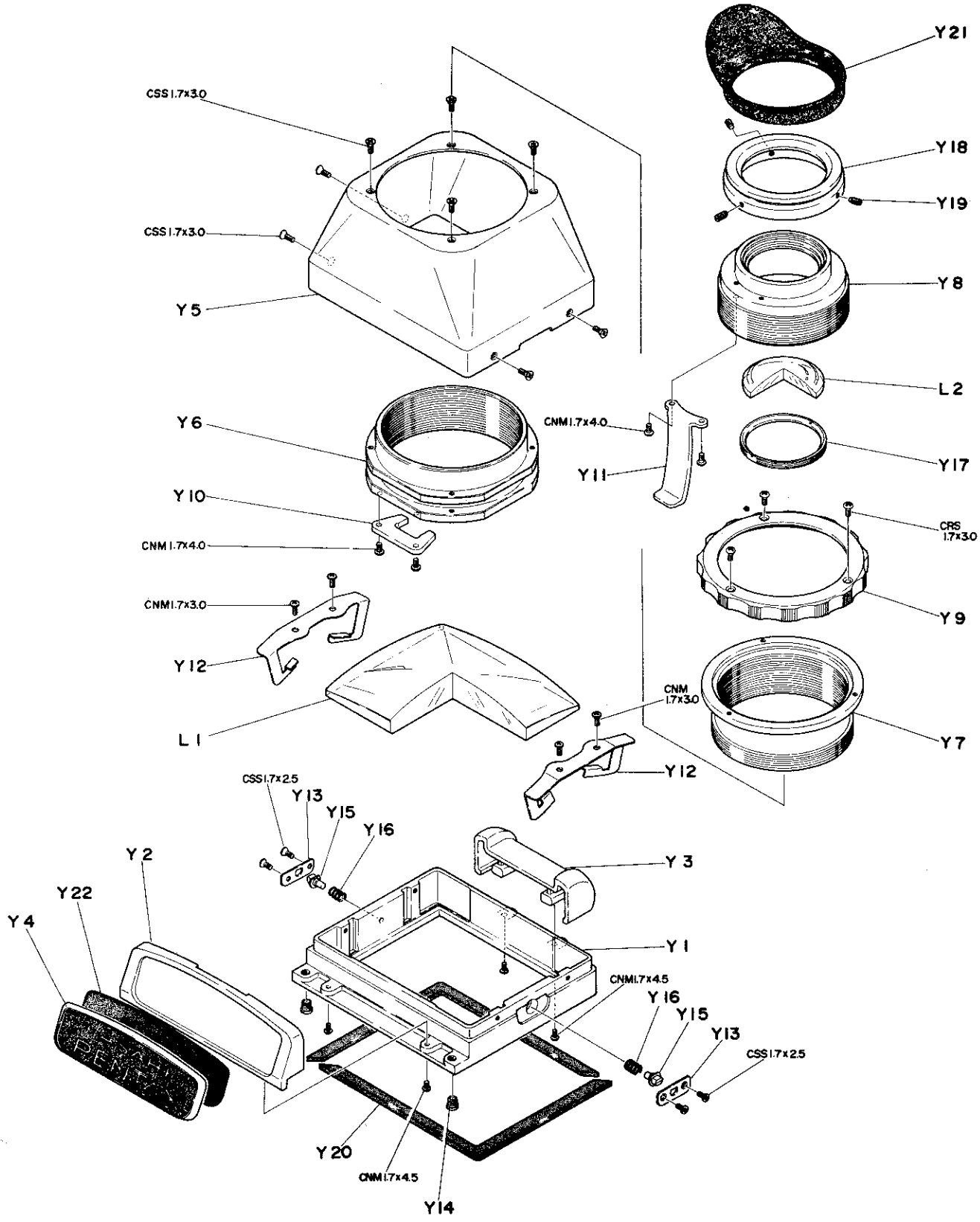
2 Perform only after a full-aperture metering adjustment has been made.

3 Establish a correct metering level, by adjusting VR2, at the check points shown in Table, Fig4-2 .
(Small difference at each check point may exist within an allowable error)

PRODUCT No. 71004

6×7 RIGID MAGNIFYING HOOD

EXPLODED ILLUSTRATION



Product No. 71004

6×7 RIGID MAGNIFYING HOOD

LIST OF SERVICE PARTS

Product No. 71004

6×7 RIGID MAGNIFYING HOOD

Note: 1. The parts with numbers starting '0-' are assembled parts
2. Only available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y1	Lens frame body	1	
Y2	Nameplate frame	1	71002–F2
Y3	Rear handle frame	1	71002–F3
Y4-01	Nameplate	1	70034–P4
Y5	Light seal hood	1	
Y6	Helicoid frame	1	
Y7	Exterior helicoid	1	
Y8	Interior helicoid	1	
Y9	Helicoid turning ring	1	
Y10	Helicoid guide plate A	1	
Y11	Helicoid guide plate B	1	
Y12	Lens retainer plate	2	
Y13	Lock pin guide	2	71002–F26
Y14	Positioning guide	2	71002–F32
Y15	Lock pin	2	71002–F27
Y16	Lock pin spring	2	71002–F28
Y17	Eyepiece retainer ring	1	
Y18	Eye-cup ring	1	
Y19	Eye-cup ring stopper	3	
Y20	Cushion	2	70034–P17
Y21	Eye-cup	1	

Parts No.	Description	Quantity	Interchangeability
Y22	Nameplate attach sheet	1	70034–P18
L1	Condenser lens	1	
L2	Eyepiece	1	

LIST OF STANDARD PARTS

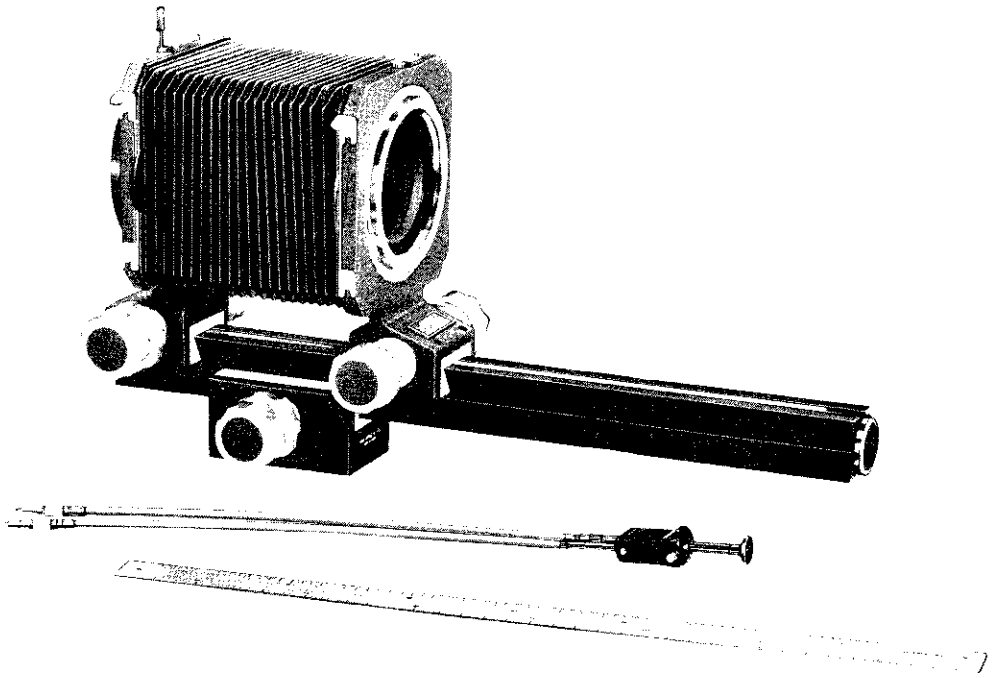
Product No. 71004
6×7 RIGID MAGNIFYING HOOD

Small screws:

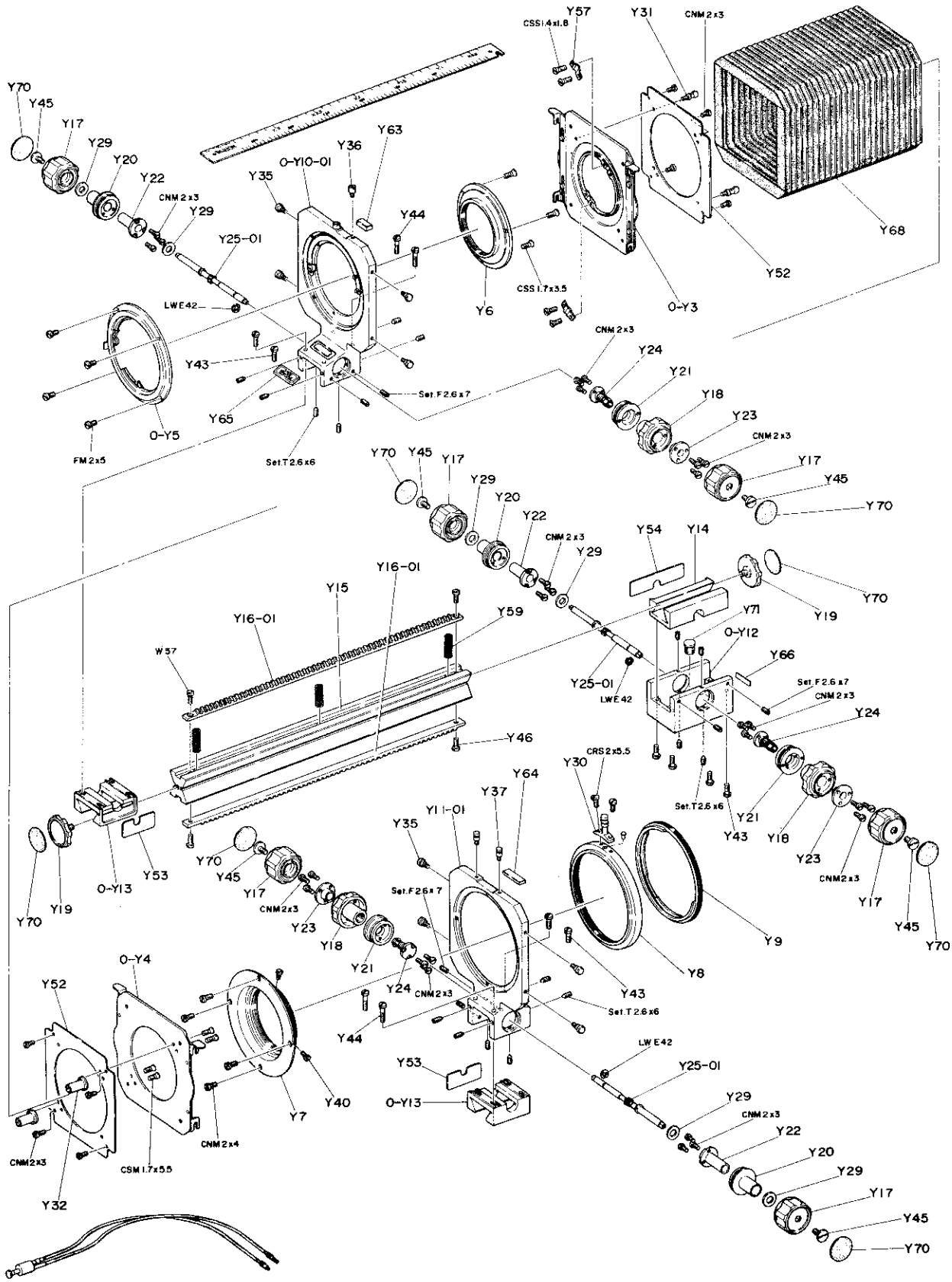
Description	Surface treatment	Position of use	Quantity
CNM1.7 x 3.0	Black nickel	Y1, Y12	4
CNM1.7 x 4.0	Black nickel	Y6, Y10	2
		Y8, Y11	2
CNM1.7 x 4.5	Black nickel	Y1, Y2	2
		Y1, Y3	2
CRS1.7 x 3.0	Black nickel	Y7, Y9	3
CSS1.7 x 2.5	Nickel	Y1, Y13	4
CSS1.7 x 3.0	Black nickel	Y1, Y5	4
		Y5, Y6	4

PRODUCT No. 71007

6x7 AUTO BELLOWS



EXPLODED ILLUSTRATION



Product No. 71007

6 × 7 AUTO BELLOWS

LIST OF SERVICE PARTS

Product No.71007
6x7 AUTO BELLOWS

Note: 1. The parts with numbers starting '0-' are assembled parts.

2. Only the available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
0-Y3	Reverse install frame assembly (Y3, Y28 x4, Y50, Y51)	1	
0-Y4	Bellows install frame assembly (Y4, Y28 x4, Y50, Y51)	1	
0-Y5	Mount ring assembly (Y5, Y38, Y47, Y49-01, Y56 x3, Y58, Y69, CNM1.7x2.2 x8)	1	
Y6	Light seal ring	1	
Y7	Mount supporter ring	1	
Y8	Mount fastener ring	1	
Y9	Camera install ring	1	
0-Y10-01	Lens install seat assembly (Y10-01, Y6, Y33, Y34, Y38, Y39, Y48, Y58)	1	
Y11-01	Camera install seat	1	
0-Y12	Rail supporter seat assembly (Y12, Y61)	1	
0-Y13	Install seat shoe assembly (Y13, Y55)	2	
Y14	Supporter seat shoe	1	
Y15	Rail	1	
Y16-01	Rack	1	
Y17	Knob	6	
Y18	Lock knob	3	

Parts No.	Description	Quantity	Interchangeability
Y19	Rail stopper	2	
Y20	Shaft receptacle install ring	3	
Y21	Collet install ring	3	
Y22	Shaft receptacle	3	
Y23	Fastener ring	3	
Y24	Collet	3	
Y25-01	Pinion shaft	3	
Y27	Stopper pin	1	
Y29	Intermediate ring	6	
Y30	Camera install lever	1	
Y31	Hook pin	2	
Y32	Hook receptacle	2	
Y35	Key install screw	8	
Y36	Indication screw	1	63323-00035
Y37	Scale supporter screw	2	
Y40	Stopper screw	2	
Y43	Shoe install screw A	8	
Y44	" " " B	4	
Y45	Knob retainer screw	6	
Y46	Rack install screw	4	
Y52	Bellows retainer plate	2	
Y53	Install plate pressure plate	2	
Y54	Supporter plate pressure plate	1	
Y57	Lens install plate spring	2	46000-00070
Y59	Coil spring	3	

Parts No.	Description	Quantity	Interchangeability
Y63	Magnet A	1	
Y64	" B	1	
Y65	Nameplate	1	
Y66	Nameplate	1	63323-00057
Y68	Bellows	1	
Y70	Covering	8	

LIST OF STANDARD PARTS

Product No.71007

6x7 AUTO BELLOWS

Small screws:

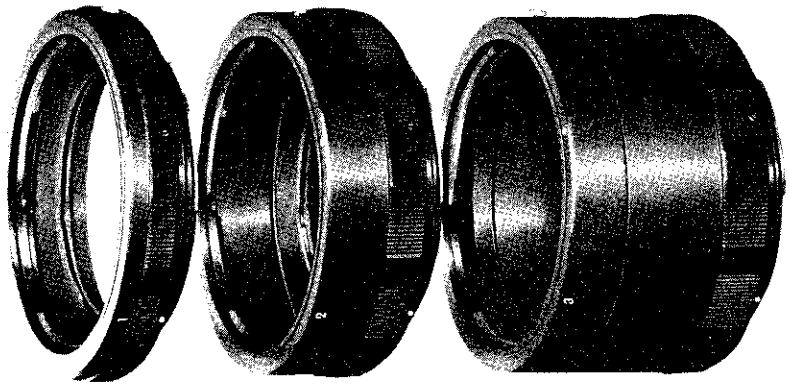
Description	Surface treatment		Position of use	Quantity
CNM1.7 x2.2	Black nickel		Y5, Y49-01	2
			Y5, Y56	6
CNM2.0 x 3.0	"		Y18, Y23	9
			Y20, Y22	9
			Y21, Y24	9
			Y3, Y52	4
			Y4, Y52	4
CNM2.0 x 4.0	"		Y11-01, Y7	4
FM2.0 x 5.0	"		Y10-01, Y5	4
CSS1.4 x 1.8	"		Y3, Y57	4
CSS1.7 x 3.5	"		Y10-01, Y6	3
CSM1.7 x 5.5	"		Y4, Y32	4
CRS2.0 x 5.5	"	(PB-5)	Y8, Y30	2
Set T2.6 x 6.0	"		Y10-01	6
			Y11-01	6
			Y12	4
Set F2.6 x 7.0	"		Y10-01	2
			Y11-01	2
			Y12	2

Washer & Lock washer:

Description	Material	Thickness	Position of use	Quantity
W57	Brass	0.05, 0.1mm	Y15	1
LW4Q 42	Steel		Y25	1

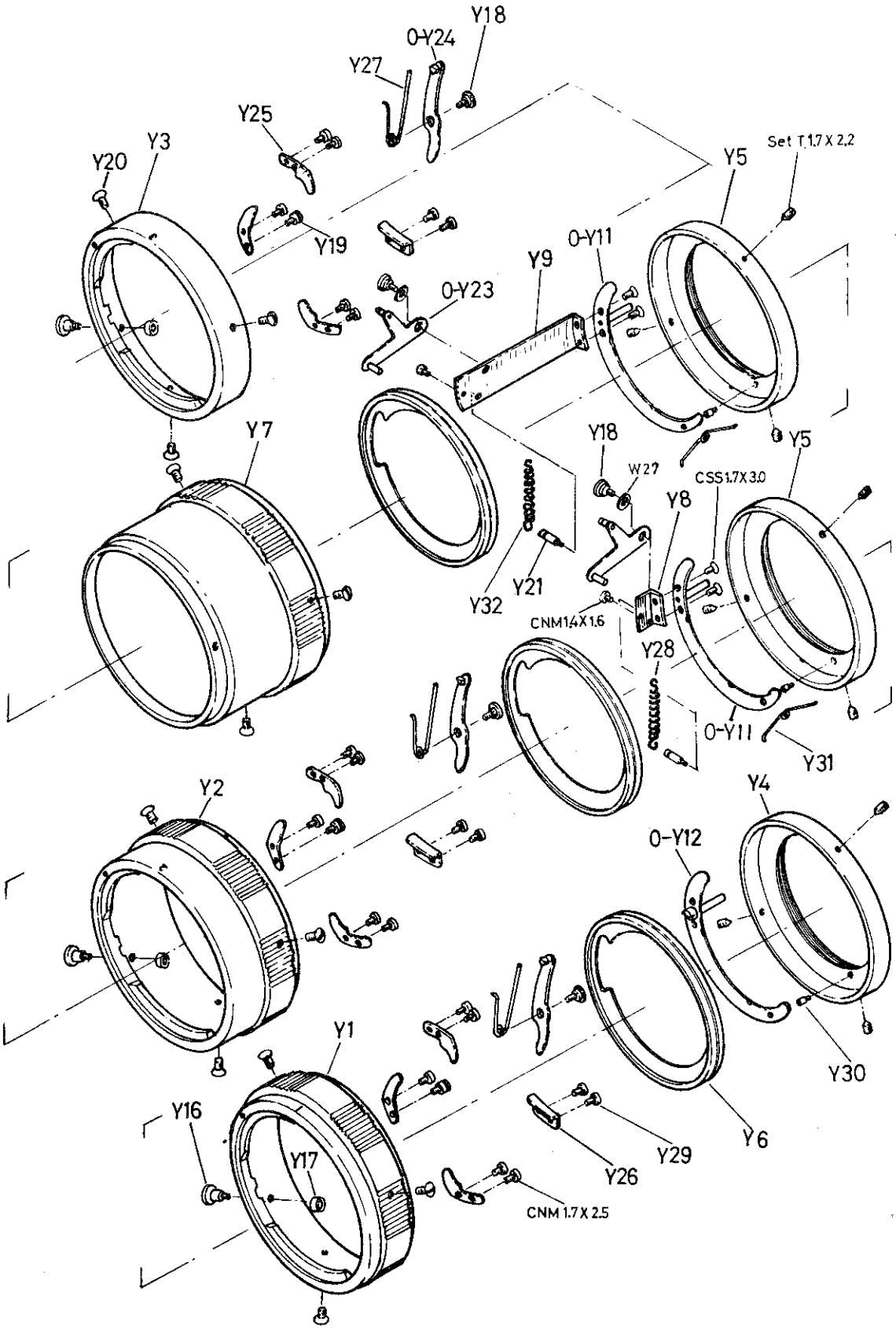
PRODUCT No. 71015

6×7 AUTO EXTENSION TUBE



02 : 73 : 3H

EXPLODED ILLUSTRATION



Product No. 71015

6× 7 AUTO EXTENSION TUBE

LIST OF SERVICE PARTS

Product No. 71015
6×7 AUTO EXTENSION TUBE

Note: 1. The parts with numbers starting '0-' are assembled parts.

2. Only the available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y1	1st mount ring	1	
Y2	2nd mount ring	1	
Y3	3rd mount ring	1	
Y4	Bayonet ring	1	
Y5	Bayonet ring	2	
Y6	Actuator lever retainer ring	3	
Y7	Intermediate barrel	1	
Y8	Diaphragm lever install ring	1	
Y9	Diaphragm lever install ring	1	
0-Y11	Actuator pin assembly(Y11, Y22)	2	
0-Y12	Actuator pin assembly(Y12, Y22)	1	
Y16	Lock release screw	3	
Y17	Lock release nut	3	
Y18	Diaphragm lever install screw	5	
Y19	Lock spring hook screw	3	
Y20	Bayonet install screw	12	
Y21	Diaphragm spring hook screw	2	
0-Y23	Diaphragm lever assembly(Y23, Y14, Y15)	2	
0-Y24	Lock lever assembly(Y24, Y10)	3	
Y25	Mount spring	9	

Parts No.	Description	Quantity	Interchangeability
Y26	Mount stopper	3	
Y27	Lock spring	3	
Y28	2nd ring diaphragm spring	1	
Y29	Mount stopper screw	6	
Y30	Actuator lever shaft screw	3	
Y31	Restitution spring	2	
Y32	3rd ring diaphragm spring	1	

LIST OF STANDARD PARTS

Product No. 71015
6×7 AUTO EXTENSION TUBE

Small screws:

Description	Surface treatment	Position of use	Quantity
CNM1.7x2.5	Black nickel	Y25, Y1	5
	"	Y25, Y2	5
	"	Y25, Y3	5
CNM1.4x1.6	"	Y8	1
	"	Y9	1
CSS1.7x3.0	"	Y22, Y8	2
		Y22, Y9	2
Set T 1.7x2.2	"	Y4, Y6	3
	"	Y5, Y6	6

Washer:

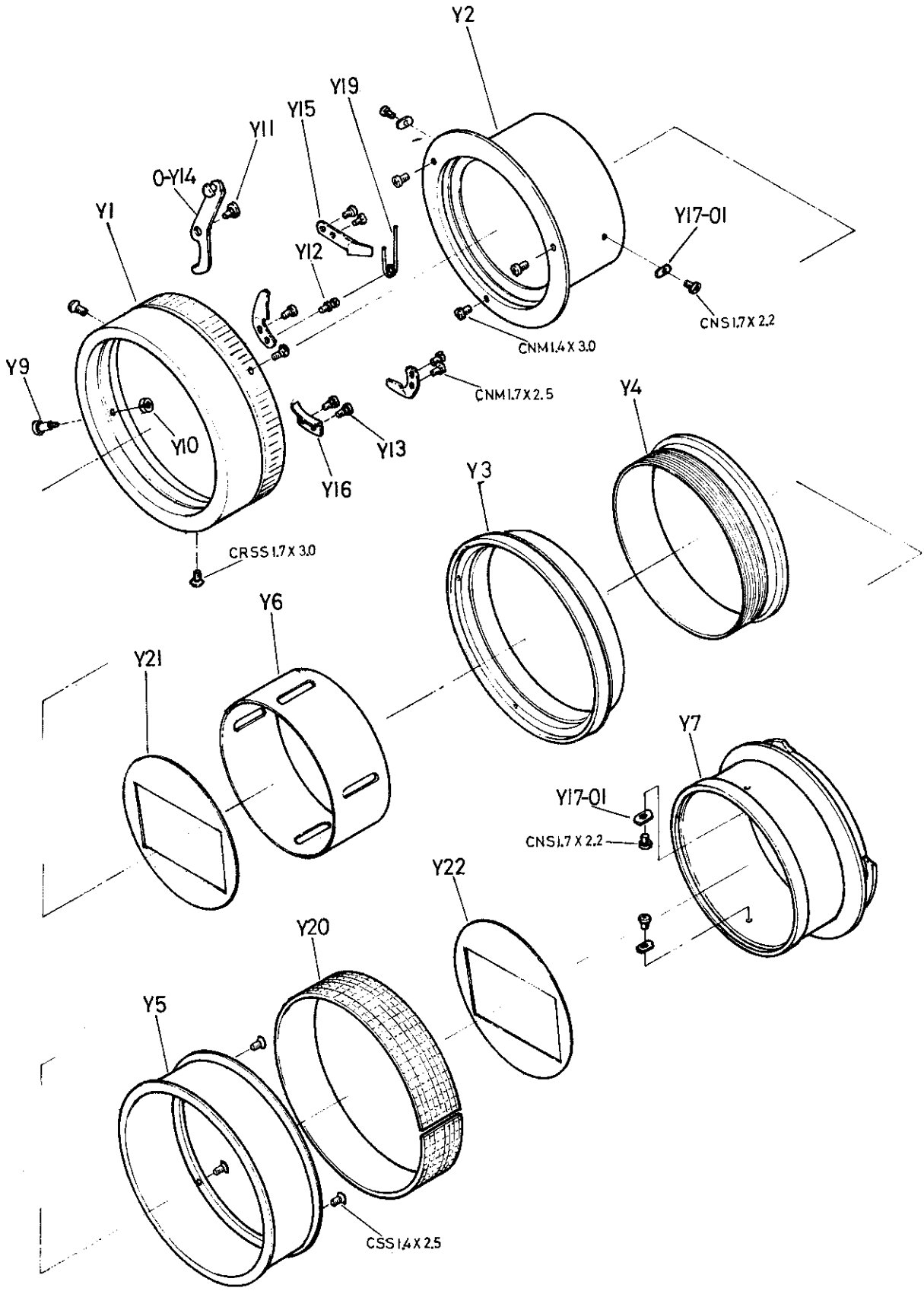
Description	Material	Thickness	Positon of use	Quantity
W27	Brass	0.1, 0.05, 0.03mm	Y15, Y23	2

PRODUCT No. 71028

6×7 HELICOID EXTENSION TUBE

11:73:3H

EXPLODED ILLUSTRATION



Product No. 71028

6×7 HELICOID EXTENSION TUBE

LIST OF SERVICE PARTS

Product No. 71028
6×7 HELICOID EXTENSION TUBE

Note: 1. The parts with numbers starting '0–' are assembled parts.
2. Only available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y1	Mount ring	1	
Y2	Guide plate install ring	1	
Y3	Connector ring	1	
Y4	Exterior helicoid	1	
Y5	Distance adjusting ring	1	
Y6	Guide ring	1	
Y7	Bayonet ring	1	
Y9	Lock release screw	1	71015–Y16
Y10	Lock release nut	1	71015–Y17
Y11	Lock lever shaft screw	1	71015–Y18
Y12	Lock syring hanger screw	1	71015–Y19
Y13	Mount stopper screw	2	71015–Y29
0-Y14	Lock lever assembly	1	71015–0-Y24
Y15	Mount spring	3	71015–Y25
Y16	Mount stopper	1	71015–Y26
Y17-01	Helicoid guide plate	4	
Y19	Lock spring	1	71015–Y19
Y20	Ruffer	1	
Y21	Light seal plate A	1	
Y22	Light seal plate B	1	

LIST OF STANDARD PARTS

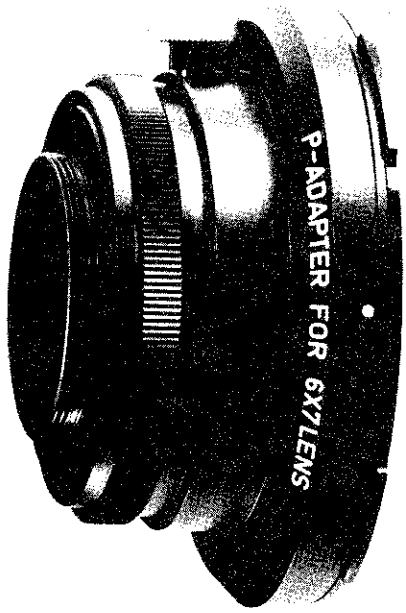
Product No. 71028
6×7 HELICOID EXTENSION TUBE

Small screws:

Description	Surface treatment	Position of use	Quantity
CNM1.4 x 3.0	Black nickel	Y2, Y3	3
CNM1.7 x 2.5	Black nickel	Y1, Y15	5
CSS1.4 x 2.5	Black nickel	Y4, Y5	3
CNS1.7 x 2.2	Black nickel	Y17, Y2 Y17, Y7	2 2
CRSS1.7 x 3.0	Black nickel	Y1, Y3	3

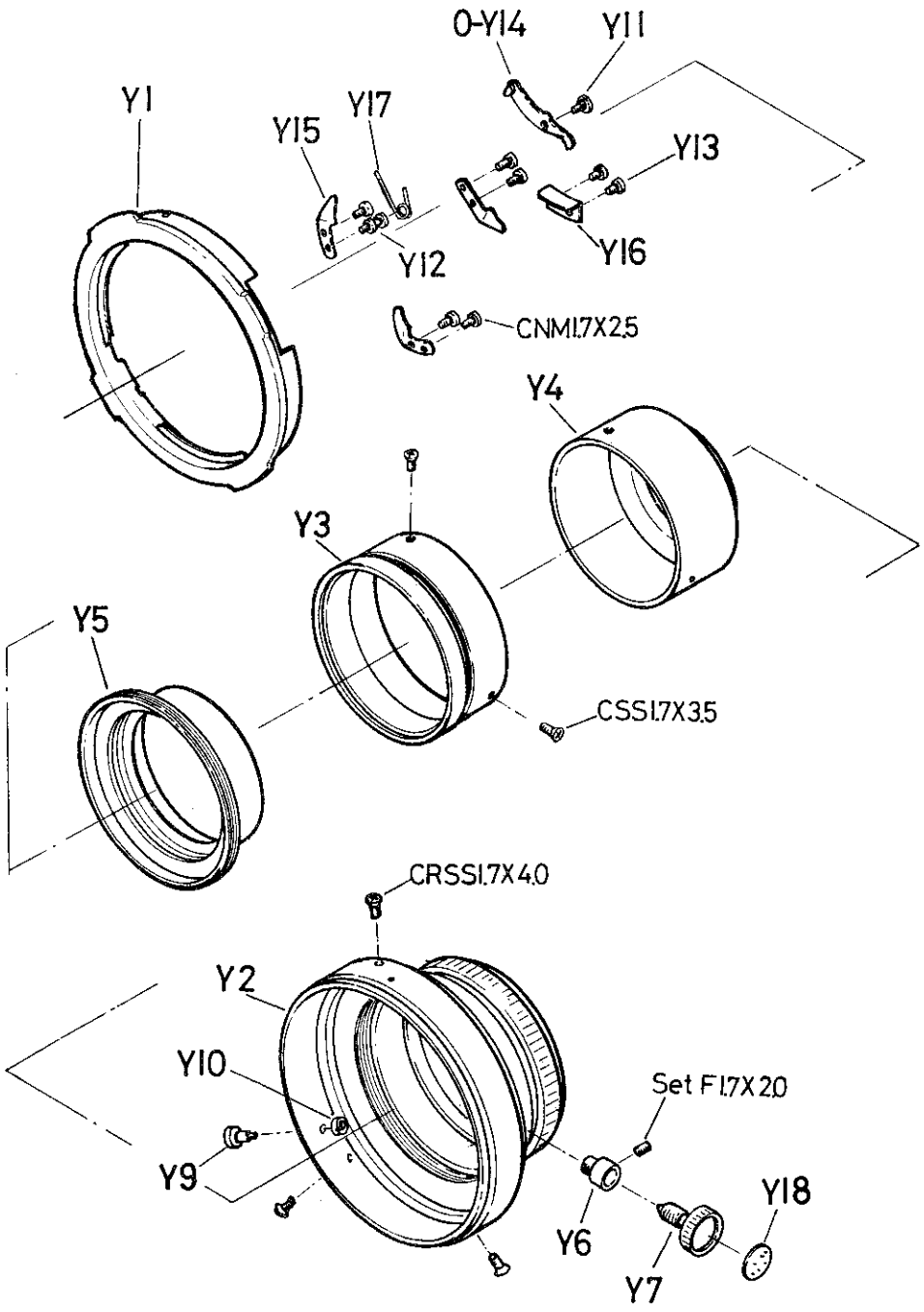
PRODUCT No. 71032

P-ADAPTOR FOR 6×7 LENS



11 : 73 : 3 H

EXPLODED ILLUSTRATION



Product No. 71032

P-ADAPTOR for 6 × 7 LENS

LIST OF SERVICE PARTS

Product No. 71032
P-ADAPTOR for 6× 7 LENS

Note: 1. The parts with numbers starting with '0-' are assembled parts.

2. Only the available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y1	Mount ring	1	
Y2	Bayonet installing ring	1	
Y3	Turning ring	1	
Y4	Seat ring	1	
Y5	Filter installing ring	1	
Y6	Lock screw seat	1	
Y7	Lock screw	1	
Y9	Lock release screw	1	
Y10	Lock release nut	1	71015-Y17
Y11	Lock lever shaft screw	1	71015-Y18
Y12	Lock lever hanger screw	1	71015-Y19
Y13	Mount stopper screw	2	71015-Y29
0-Y14	Lock lever assembly(Y14, Y8)	1	71015-0-Y14
Y15	Mount spring	3	71015-Y25
Y16	Mount stopper	1	71015-Y26
Y17	Lock spring	1	71015-Y27
Y18	Covering	1	

LIST OF STANDARD PARTS

Product No. 71032
P-ADAPTOR for 6×7 LENS

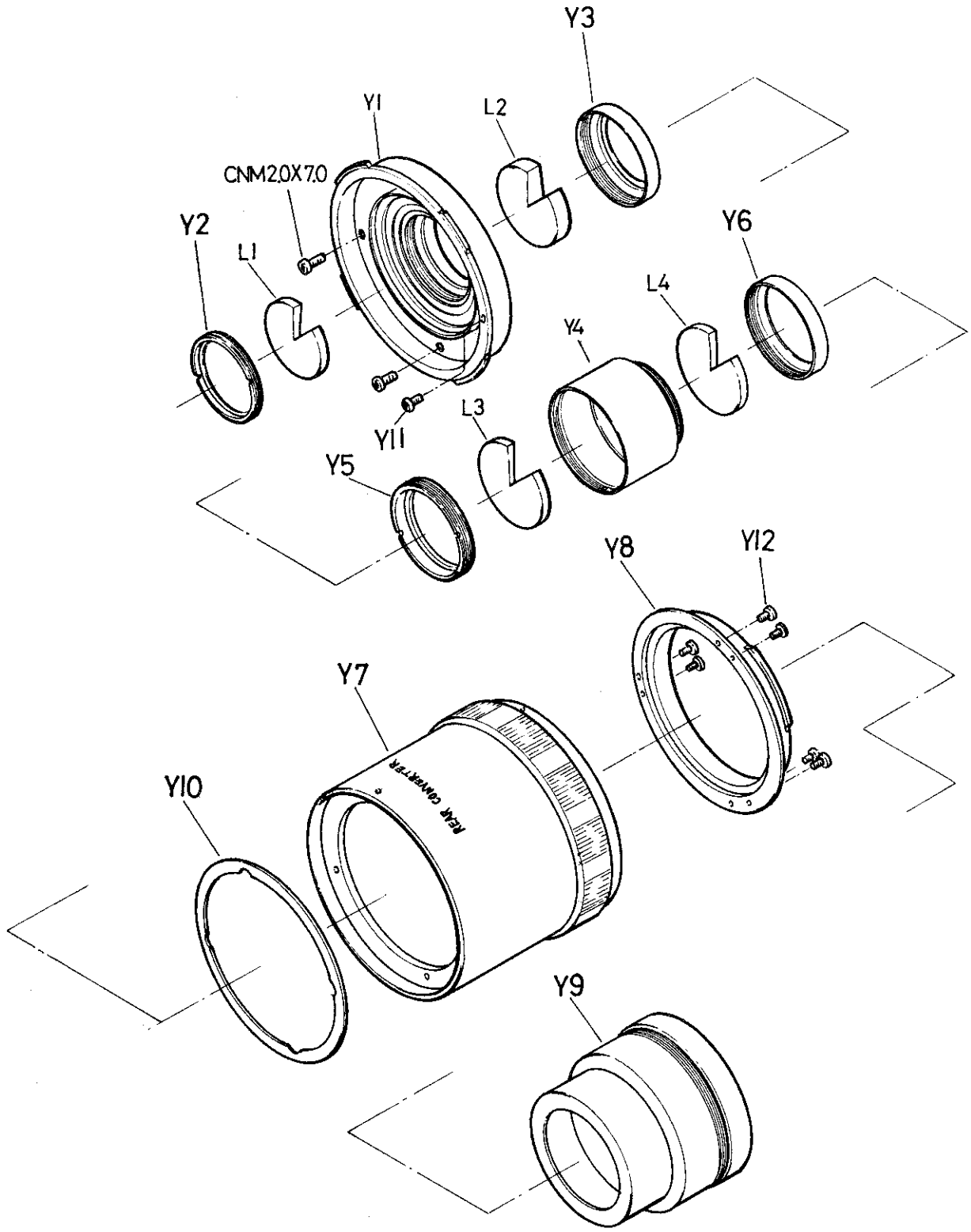
Small screws;

Description	Surface treatment	Position of use	Quantity
CNM1.7x2.5	Black nickel	Y1, Y15	5
CSS1.7x3.5	Black nickel	Y3, Y4	3
CRSS1.7x4.0	Black nickel	Y1, Y2	3
Set F1.7x2.0	Black nickel	Y6	1

PRODUCT No. 71033

6×7 REAR CONVERTER 2X

EXPLODED ILLUSTRATION



Product No. 71033

6 × 7 REAR CONVERTER 2X

LIST OF SERVICE PARTS

Product No. 71033
6× 7 REAR CONVERTER 2X

Note; 1. The parts with numbers starting '0-' are assembled parts.

2. Only available parts are listed below.

Parts No.	Description	Quantity	Interchangeability
Y2	1st lens retainer ring	1	
Y3	2nd lens retainer ring	1	
Y5	3rd lens retainer ring	1	
Y6	4th lens retainer ring	1	
Y7	Bayonet installing ring	1	
Y8	Bayonet ring	1	
Y9	Light seal ring	1	
Y10-00A	Adjusting ring A 2mm	1	
00B	" B 1. 5mm		
00C	" C 0. 3mm		
00D	" D0. 2mm		
00E	" E 0. 1mm		
Y11	Positioning screw	1	71016-Y6
Y12	Bayonet installing screw	6	46080-X43

LIST OF STANDARD PARTS

Product No. 71033

6× 7 REAR CONVERTER

Small screws;

Description	Surface treatment	Position of use	Quantity
CNS2. 0x7. 0	Black chrome	Y1, Y7	4